# COURSE-BOOK

## UNDER GRADUATE PROGRAMMES

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## DEPARTMENT OF FIRST YEAR ENGINEERING
### SCHEME OF EXAMINATION AND TEACHING FOR BACHELOR OF ENGINEERING
#### FIRST YEAR B.E. (COMMON TO ALL BRANCHES)

**SEMESTER-I**

<table>
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<th>Sub. Code</th>
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<th>Teaching Scheme</th>
<th>Credits</th>
<th>Evaluation Scheme</th>
<th>Duratio n of Paper Hours</th>
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<td>Applied Physics/Applied Chemistry</td>
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**SEMESTER-II**

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2
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BAML101 APPLIED MATHS-I

Course Objectives:
1. To introduce Successive Differentiation and its application in the field of Engineering.
2. To introduce the concepts and applications of Partial Differentiation and Integral Calculus in the field of Engineering.
3. To introduce concepts of matrices and its application in the field of Engineering.
4. To develop skills in students to solve simple engineering based on sequences and series.

Differential Calculus (12 Hrs)

Partial Differentiation (8 Hrs)
Partial differentiation, functions of several variables, first and higher order derivatives, Euler’s theorem, chain rules and total differential coefficient.

Partial Differentiation (Jacobian) (10 Hrs)
Jacobian, Taylor’s and Maclaurin series of two variables, maxima and minima of function of two variables, Lagrange’s method of undetermined multipliers.

Integral Calculus (10 Hrs)
Beta and Gamma function, Differentiation under integral sign, Tracing of curves (Cartesian and polar curves), Quadrature, volumes and Surface of solids of revolutions (Cartesian, polar and parametric forms). Specific applications of respective branch.

Matrices-I (10 Hrs)
Inverse of matrix by adjoint method & its use in solving simultaneous equations. Rank of matrix, consistency of system of equations, linear dependence, linear & orthogonal transformations, inverse of matrix by partitioning method

Matrices-II (10 Hrs)
Characteristics equation, eigen values & eigen vectors, reduction to diagonal form, Cayley Hamilton theorem (statement & verification), Sylvester’s theorem, association of matrices with linear differential equations of second order with a constant coefficients. Specific applications of respective branch.

Course Outcomes:
At the end of the course the student shall be able to:
1. Use Successive Differentiation and Integral Calculus to solve engineering problems.
2. Solve engineering problems using Partial differentiation.
3. Apply concepts of matrices and its application for solving engineering problems and Develop mathematical model for various engineering problems and their solutions.

Text Book:

Reference Books:

BPHL102 APPLIED PHYSICS

Course Objectives:
1. Demonstration of the fundamentals of uniform and non uniform electric and magnetic fields to solve related problems and working of related devices.
2. Introduction to the working and applications of fundamental lasers.
3. Familiarization and demonstration of the concepts of interference and polarization and its applications.
4. Explanation of the concepts of semiconductor physics and working of various diodes.
5. Introduction of advanced trends in the field of electric field, magnetic field, interference, polarization, laser and material science.

Course Outcomes:
At the end of the course the student shall be able to:
1. Solve the problems related to the applications of uniform & non uniform electric and magnetic fields and use related devices for engineering applications.
2. Apply the knowledge of interference, polarization & laser to solve related problems & applications.
3. Demonstrate the knowledge of advanced topic related to electric field, magnetic field, interference, polarization, laser and material science.

Unit I: Quantum Mechanics (12 Hrs)
Compton Effect, Wave – particle duality, de Broglie wavelength, Davisson-Germer experiment; Heisenberg’s uncertainty principle, Phase velocity, group velocity, Concept of a wave packet; Wave function and its probability interpretation; Schrödinger’s wave equation; Infinite potential well; Qualitative nature of the wave function for finite potential well; Tunneling

Unit II: Semiconductor Physics (12 Hrs)
Qualitative ideas on formation of electron energy bands in solids; Classification of solids into insulators, semiconductors and conductors; Fermi energy; Intrinsic semiconductors; Energy band diagrams of silicon and germanium and their comparison with band diagrams of carbon (diamond) and sodium; Extrinsic semiconductor; Dependence of Fermi energy on temperature and doping concentration(Qualitative analysis); Current conduction in a semiconductor; Hall effect, p-n junction diode; Diode rectifier equation; Zener diode, Avalanche and Zener Break Down mechanisms, LED

Unit III: Lasers (10 Hrs)
Laser characteristics; spontaneous and stimulated emission of radiation; Population inversion; Three and four level laser schemes, optical resonator, Expressions for coherence length and coherence time, Outline of construction of Ruby and He-Ne laser, Semiconductor Laser

Unit IV: Wave Optics (08 Hrs)
Interference in thin films of uniform & non-uniform thickness, Anti-reflection coating, Polarization & its type; Polarization by reflection; Polarization of scattering, Malu’s law, Optic axis, Double refraction in a quartz prism, Quarter- and Half-wave plates, Production & Detection of Linear, Circular, Elliptical polarizations

Unit V: Electron Ballistics (12 Hrs)
Motion of charges in uniform electric and magnetic fields; Electron optics: Bethe’s law; Electrostatic and magneto static focusing; Devices: CRT, CRO and Cyclotron

Unit VI: Advanced Trends in Physics (06 Hrs)

Text Book:

Reference Books:

BPHP102 Term Work:
Students are required to conduct any eight of the following experiments:

BPHP102 Term Work:
Students are required to conduct any eight of the following experiments:

1. Application of CRO: Determination of phase difference between two ac signals.
2. Application of CRO: Determination of amplitude and frequency of ac signal by Lissajous method.
3. Application of Velocity filter using CRT: To determine e/m by Thomson’s method.
5. Application of interference: Determination of wavelength of given source of light using Newton’s ring set up.
6. Application of interference: Determination of refractive index using Newton’s ring set up.
8. Determination of energy band gap of semiconductor diode.
9. Determination of activation energy of a Thermistor.
10. Determination of Band gap by four probe method.
11. Determination of electrical resistivity of semiconductor by using four probe method.
12. Comparison of V-I characteristics of various diodes.
15. Application of Diode: Determination of Planks Constant by using LEDs.
17. Polarization: Verification of Brewster’s Law.
20. Open ended list of experiments

BCHL103 APPLIED CHEMISTRY

Course Objectives:
1. To understand the application and importance of water treatment for domestic and industrial purpose.
2. To acquire the knowledge of types, properties and application of lubricants, advance engineering material, also about corrosion of metal and its prevention
3. To acquire the knowledge of types and applications of Fuel, battery, different types of environmental pollution and its consequences.

Course Outcome:
At the end of the course the student shall be able to:
1. Use knowledge of water treatment for domestic and industrial purpose.
2. Use the concept of corrosion of metals lubricant and advance engineering materials for varied engineering applications.
3. Apply knowledge of uses of different types of fuels & their combustion, working and application of battery and environmental pollution & consequences.

Water Technology: (12 Hrs)
Impurities in water, Sources of water, Domestic water treatment (Chlorination, ozonization, UV radiation), Hardness, Water softening processes – Lime – Soda process, zeolite process Ion exchange method, boiler feed water, boiler problems-scale, sludge, priming and foaming and caustic embitterment, their causes and prevention, removal of dissolved gases, carbonate and phosphate conditioning, colloidal conditioning, calgon treatment, Numerical on hardness, zeolite and Lime-Soda process .Clean water technology using Electro-dialysis and reverse osmosis process

Lubricants: (8 Hrs)
Introduction, mechanism of lubrication, classification of lubricants, (Liquids, semi– solid (Grease) and solid (MoS2, Graphite). Additives for lubricants. Properties of lubricants (Flash & Fire point, Saponification number, Iodine value, Acid value, Viscosity and Viscosity index Aniline point, Cloud point and pour point) Numerical problems based of viscosity Index. Criteria for selection of lubricants.

Fuel Technology & combustion calculation (12 Hrs)
Classification, calorific value: gross and net calorific values and their determination by bomb calorimeter and Boy’s gas calorimeter.
Liquid Fuels: Mining and Refining of Petroleum oil, fractional distillation, cracking of heavy oil residues – catalytic cracking, Fluid bed catalytic cracking, Manufacturing of synthetic Gasoline,(Fischer Tropsch Method) knocking and chemical structure, octane number and cetane number and their significance, catalytic convertor, power alcohol, , Numerical on calorific value, combustion.
Alternate fuels and energy sources: Bio-diesel, Power alcohol, renewable energy sources: Solar wind, tidal wave geothermal etc. propellant.

Corrosion Science and Battery Technology:(10 Hrs)
Battery Technology: Introduction, Basic concept of battery, Classification and types of batteries (Dry cell, Rechargeable battery: Lead acid battery, Lithium ion, Ni-Cd and Fuel Cells)

Environmental Pollution and Control Techniques (6 Hrs)
Air pollution, water pollution-Analysis technique for the parameters like DO, BOD,COD and TOC. Waste water and its treatments.
Green Chemistry: Introduction, Twelve Principles of Green Chemistry, Green synthesis and solvents
(ionic liquid supercritical CO₂), and products from natural materials, CO₂ emission and carbon credit.

**Advances in Engineering Chemistry** (6 Hrs)

**Text Book:**

**Reference Books:**

**BCHP103 Term Work:**
Students are required to conduct any eight of the following experiments:
1. Determination of Total, Permanent and Temporary hardness of given water sample by complexometric titration.
2. Estimation of calcium hardness in water by EDTA.
3. To determine amount Ca²⁺ ions removed by cation exchange resins.
4. Determination of Ni²⁺ in given sample by complexometric titration.
5. To determine Type & Extent of alkalinity of given water sample by Warder’s method.
7. Determination of Fe²⁺, Fe³⁺ and Total iron present in the given solution by Redox titration.
8. Determination of amount of Cu²⁺ ions by iodometric titration.
10. Determination of viscosity of lubricating oil at different temperatures by Redwood Viscometer.
11. Determination of Flash Point of lubricating oil by Penskey Marten’s / Abels closed – cup apparatus.
12. Determination of Acid value of given lubricating oil.
14. To estimate the amount of Free Chlorine present in the given Water sample.
15. Demonstration
16. Open ended list of experiment

**Laboratory Manual:**
3. A textbook of Experiments and calculation in Engineering Chemistry. By Dr. S. S. Dara

**BITL104: BASICS OF COMPUTING** Total Hrs: 30 Hrs.

**Course Objectives:**
1. To make student aware about Linux Operating system & Networking.
2. To train students to develop modules for solving problems using C programming language.

**Course Outcomes:**
At the end of the course the student shall be able to:
1. Understand the concept of Operating System, Linux commands & networking.
2. Demonstrate the knowledge of various concepts of C language by developing the real time application.

Demonstrate knowledge of advanced concepts.

**UNIT I: Operating Systems** (3Hrs)
Introduction, Windows, Linux-Basic command.

**Computer Networks:** Introduction, Peer to peer connection, LAN, MAN, WAN, Internet, Wireless network.

**UNIT II: C Fundamentals** (4 Hrs)
UNIT III: Arrays, String & Structure (6 Hrs)
One and Two Dimensional Arrays, Initialization, String variables, Declaration, Reading, Writing, String handling functions, User defined functions, Variables and storage classes. Recursion, Preprocessor, Structure definition. Initializing, Assigning values, Passing of structure as arguments, Unions, Programming Examples.

UNIT IV: Pointers & File Management (7 Hrs)
Declaration and initializing pointers, Pointer based expressions, Arrays, Strings,Structures, C program examples, File management in C, Opening and closing, I/O operations on files. Programming Examples.

UNIT V: Enumerated Data types & Functions (7 Hrs)
Enumerated data types, Renaming data types with typedef ( ), Type casting, Bit wise operators. and bit manipulation. pointer to pointer, Pointers to functions, Functions Returning pointers, Functions with variable number of arguments, Dynamic memory allocation. Programming Examples.

UNIT VI: Advanced Topic (3 Hrs)
Text Book:

Reference Books:

BITP104: Term Work

<table>
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<th>No.</th>
<th>Task</th>
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<tbody>
<tr>
<td>1</td>
<td>Perform the basic Linux commands.</td>
</tr>
<tr>
<td>2</td>
<td>An company (Eg. Electric Power, Water Supply and Gas Supply) charges its domestic consumers as follows: Consumption Units Rate of Charge 0 – 200 Rs. 0.50 per unit 201- 400 Rs. 100 plus Rs. 0.65 per unit excess of 200 401 – 600 Rs. 230 plus Rs. 0.80 per unit excess of 400 601 and above Rs. 390 plus Rs. 1.00 per unit</td>
</tr>
<tr>
<td>3</td>
<td>Design a program: a) For trigonometric series Eg [ \sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots + \frac{x^n}{n!} ] b) To print all prime number in given range.</td>
</tr>
<tr>
<td>4</td>
<td>A. Design a menu-driven program to perform following conversion on any 1) decimal to binary 2) decimal to octal 3) binary to octal 4) Exit B. Print Fibonacci series upto n terms using recursion.</td>
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<tr>
<td>5</td>
<td>Enter any element and search whether element is present in array or not using binary search.</td>
</tr>
<tr>
<td>6</td>
<td>Design Program to perform following operation on string a) Find length of string b) To compare two string c) To copy one string to another</td>
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BECL105 BASIC ELECTRONICS

Course Objectives:
1. To familiarize with various electronic components and understand their properties.
2. To understand basic fundamentals of analog and digital circuits.
3. To prepare for various engineering applications.
Course Outcomes
Students shall be able to:
1) To understand the basic working principles of Electronic devices and circuits
2) To gain the concepts of Semiconductor physics
3) To design and analyse basic electronic circuits
4) To measure the performance parameters of electronic circuits

Unit I: Bipolar Junction Transistor and its applications (12 Hours)
Transistor action, BJT configurations: CE, CC, CB with normal biasing, DC load line, Single stage CE transistor as amplifier, I/P and O/P impedance, Practical amplifier biasing, RC coupled single stage Amplifier, frequency response and bandwidth, BJT as a switch

Unit II: Digital Electronics Fundamentals (12 Hours)

Unit III: Combinational Circuit Design (12 Hours)
Fast adders (carry look ahead, parallel adder), Sequential circuits, Flip flops, registers, counters, Multiplexers, Demultiplexers, encoder, decoder, comparators

Advanced Trends in Basics of Electronics

Text Books:

Reference Books:
1. Electronics Principles: Malvino, PHI.
2. Devices & Circuits: Allen Mottershed, PHI.
3. Electronics Devices And Circuits By-Millman And Halkies
4. Digital Logic and Computer Design: Morris Mano (PHI)
5. Digital Electronic Principles- Malvino PHI

8. Digital Communication Lee S C (Wiley)
9. Principles of Electronics (S. Chand )

BECP105 Term Work:
Students are required to conduct any eight of the following experiments:
1. Study of transistor in CB configuration.
2. Study of various gates AND, OR, NOT, NOR, NAND, EXOR.
3. Study of CE as RTL Logic for NOT gate.
5. Study of half subtractor and half adder / Study of full adder and full subtractor
6. a) Study of design of multiplexer
   b) Study of design of demultiplexer
7. Formation of multiplexer by using NAND gates
8. Study of D Flip Flop
9. Study of SR latch
10. Study of Shift register
11. To study seven segment for digital counters
12. To study ripple counters
13. To study J-K Flip flop
14. To study R-C Coupled amplifier
15. To form the IC tester on bread board
16. To study Transistor used as NAND TTL Logic
17. To study T flip flop
18. To form Universal gate by the use of another universal gate
19. To design the electronic circuit from given application (Any type)
20. Use of PCB for making circuits
21. The study of Comparator by using different gates
22. Open ended list of experiment

BEEL106 BASIC ELECTRICAL
Course Objectives:
1. To prepare students to understand basic fundamentals of Electrical Circuits
2. To train students to perform electrical measurements

Course Outcome:
At the end of the course the student shall be able to:
1. Apply basic electric circuit laws to solve electric circuit problems and design basic D.C. electric circuit using circuit analysis techniques.
2. Perform simple capacitance calculations and explain basic concepts in electric and magnetic fields.
3. Apply basic A.C. electric circuit laws in solving A.C. circuit problems and able to perform A.C. power calculation.
4. An ability to solve engineering problems in one or more specializations of Electrical Engineering.

Student shall be able to use this knowledge for conducting the experiments to demonstrate the knowledge gained.

Unit I: Electric Circuits (08 Hrs)
- Circuits Elements (R, L, C), Kirchhoffs Laws, Superposition Theorem, Voltage source, (definition, characteristics of practical source, equivalent current source) Star-Delta transformation. Magnetic circuits: Flux, mmf, reluctance, analogous electric circuits, simple calculations for composite magnetic circuits.

Unit II: A.C. Circuits (09 Hrs)
- Periodic functions, average & rms values, Steady state behaviors with sinusoidal excitation, phasor representation, reactance and impedance, Series and Parallel A.C. circuits, resonance, power in A.C.circuits, power factor, Principle of generation of single phase & Three phase voltages. Power in balanced three phase A.C. systems.

Unit III: Electrical Measurements (08 Hrs)
- Deflecting, controlling and damping mechanisms. Ammeters and voltmeters of permanent magnet moving coil type, electrodynamometer type, Wattmeter, Induction type single phase, meters, Extension of Instrument range.

Unit IV: Single Phase Transformers (10 Hrs)

Unit V: D.C. Machines (8 Hrs)
- Introduction, construction, EMF and Torque equation, classification, self-excitation of D.C. shunt generators, EMF, voltage, current relations in generator and motor, Characteristics, starting and speed control of d. c. motors.

Unit VI: Introduction to AC Motors (7 Hrs)

Text Book:

Reference Books:

BEEP106: TERM WORK:
Students are required to conduct any eight of the following experiments:
1. To Verify KVL & KCL of electric circuit using fundamentals of mesh and node.
2. To control one lamp by two switches (stair case wiring study).
3. To Determine Active and Reactive power of Choke coil.
4. To find the power factor and to study Power triangle of R-L-C Series circuit.
5. To Find Efficiency and Regulation of Single Phase Transformer By O.C & S.C Test.
6. To find Line & phase quantities in Three Phase star & delta Connected balanced Load.
7. Study of phase relationship in R-L-C parallel network by computer simulation using P-Sim Software.
8. Comparative study of super capacitor and normal capacitor.
9. Observe the speed reversal of D.C motor and three phase induction motor.
10. To find voltage & current ratio of single-phase transformer.
11. To study superposition theorem & find i, (08 hrs) circuit using MATLAB software.
12. Write a program to find the values of speed & torque for a dc shunt motor using MATLAB software.
BCEL107 ENGINEERING MECHANICS

Course Objectives:
1. To describe and be able to predict the conditions of rest or motion of the bodies under the action of forces.
2. To understand the basic concepts of forces moments, couples in two dimensional force system & spatial force system.
3. To provide basic concepts of dynamics.
4. To be able to analyze the stresses, strains and deformations of simple deformable structural elements under axial loading.

Course Outcomes:
1. Understand the basic concepts of forces, moments, and couples in two dimensional & spatial system.
2. Apply the concepts of free body diagrams for static equilibrium in the beam and trusses.
3. Demonstrate the knowledge of dynamics, stress, strain and deformations of simple structure elements under axial loading.

Unit I: Fundamentals of Statics (01 Hr)
Definition of mechanics, Body, Rigid Body, Scalar quantities, Vector quantities, Representation of vector, Fundamental Units, Derived Units, Particle, Mass, Weight, Fundamental principles of mechanics, Newton’s law of universal gravitation.

Unit II: Equivalent Force System (2-D) (04 Hrs)
Concept of Force, Unit Newton force, System of force, Principle of transmissibility of force, Resolution and composition of coplanar force system, Resultant, Equilibrant, Law of parallelogram of force, Triangle law, Polygon law, Moment of force, Varignon’s theorem, Couple and it’s properties, Reduction of system of forces into a force couple system. Numericals on equivalent force involving co-planer force systems acting on body, Numericals on reduction of system of forces into a force couple system.

Unit III: Equilibrium of Two Dimensional Force System (02 Hrs)


Concentrated load, Uniformly distributed load (UDL), Uniformly varying load (UVL), Types of support i.e. Simple support, Hinge support, Roller Support, Numericals on reaction of beam subjected to combination of loads.

Analysis of Truss:
Perfect Frame, Imperfect frame, Deficient frame, Redundent frame, Assumptions made in analysis of truss, Method of joints, Method of sections, Numericals on forces in the members of a truss.

Unit V: Spatial Force System (Three Dimensional Force System) (08 Hrs)
Component of force in a space, Resultant of spatial force system, Force multiplier, Cartesian form of representation of vector, Unit vector, Position vector, Displacement Vector, Scalar product or Dot product, Vector product or Cross product, Length of common perpendicular between two non intersecting vectors, Shortest distance, Moment of force about point, Moment of force about axis, Moment arm of force about point, Moment arm of force about axis, Resultant moment, Couple

Unit VI: Friction (03 Hrs)
Definition of friction, Types of friction, Angle of repose, Coulombs laws of dry friction, Analysis of rigid bodies on rough inclined surfaces

Unit VII: Properties of Areas (04 Hrs)
Centroid of plane areas, Moment of Inertia of composite lamina, Radius of gyration, Second moment of area, Product of inertia, Parallel axis theorem, Perpendicular axis theorem, Polar moment of inertia, Moment of inertia & product of inertia about new axes, Principal moment of inertia and principal axis direction by analytical method only

Virtual Work (03 Hrs)
Virtual Displacement, Definition of virtual work, Principles of virtual work, Virtual work method applied to beams, frames & mechanisms.

Kinematics (03 Hrs)
Motion curves, Rectangular components of acceleration, Normal & tangential components of acceleration

Kinetics (03 Hrs)
Kinetics of rectilinear and circular motion of a particle acted upon by a constant and variable force system. D’Alembert’s principle, Concept of dynamic equilibrium, Rectilinear motion of interconnected bodies / particles. (Limited to two interconnected bodies).

Impulse and Momentum (03 Hrs)
Linear impulse, Linear momentum, Momentum equation for a particle and a system of particles, Direct central impact, Coefficient of restitution.

**Advanced Trends in Engineering Mechanics**

**Text Book:**

**Reference Books:**

**BCEP107 TERM WORK:**
Students are required to conduct any eight of the following experiments:

1. Familiarity of Simple Lifting Machine
2. To Determine the Law of Machine for Single Purchase Crab.
3. To Determine the Law of Machine for Screw Jack
5. To Determine the Coefficient of Friction by Inclined Plane.
6. To Determine the Coefficient of Coil Friction.
7. To Determine the Reaction at The Supports of Simply Supported Beam.
8. To Determine the Forces In the Members of Simple Jib Crane.
9. To Determine the Forces In the Members of Shear Leg
10. To Determine the Law of Machine for Double Purchase Crab.
11. To Determine the Moment of Inertia of Fly-Wheel.
12. Verification of law of parallelogram of forces & verification of law of polygon of forces. (One numerical on each).
13. To Determine the Resultant of Non-Concurrent & Parallel Force System by using Graphical Method (One numerical on each).
14. To Determine the Beam Reaction & Forces in the Member of Truss for Equilibrium Condition by using Graphical Method (One numerical on each).
15. Determination of principal moment of inertia and principal axis direction by Mohr’s Circle Method. (Two numerical)
16. Open Ended Experiment on Force System and Equilibrium

**BMEL108 ENGINEERING GRAPHICS**

**Course Objectives:**
1. To familiarize with basic engineering graphics principles and standards of drafting.
2. To equip with various techniques to create technical drawings.
3. To train in sketching, manual drafting and computerized drafting appropriately.

**Course Outcome:**
At the end of the course the student shall be able to:
1. Understand and apply basic engineering graphics principles.
2. Read, interpret and create technical drawings that capture the concept and design.
3. Communicate creative ideas using sketching, manual drafting and state of art CAD appropriately

**Unit I: Introduction**
Use of various drawing instruments, lines, lettering and ISI standards for drafting. Simple geometrical construction.
Definition of scale, Representative fraction, construction of various scales such as Plain, Diagonal, Comparative, Vernier, and Scale of Chords. Introduction to basic Engineering curves (conic sections )

**Unit II: Theory of Projections**
Theory, techniques, first and third angle projections, multi view drawing from pictorial views.) and view in orthographic projections. Projection of points. Projection of straight lines inclined to both reference plane.

**Unit III: Projection of Planes**
Projection of plane figures such as triangle, quadrilateral, regular polygons circle, Plane inclined to both reference plane. Auxiliary planes and view:
Auxiliary vertical plane and Auxiliary inclined plane. True shapes of plane figures.

**Unit IV: Projection of Solids** (3 Hrs)
Projections of solids such as Prisms, pyramids, cone, cylinder with varying position of axes with ground line.

**Unit V: Sections of Solids** (3 Hrs)
Section of solid such as Prisms, pyramids, cone, cylinder and introduction to development of surfaces.

**Unit VI: Orthographic Projection** (2 Hrs)
Conversion of pictorial view of solid to orthographic views.

**Course Outcome:**
At the end of the course the student shall be able to:

1. Understand and apply basic engineering graphics principles.
2. Read, interpret and create technical drawings that capture the concept and design.
3. Communicate creative ideas using sketching, manual drafting and state of art CAD appropriately

**Books:**

**BMEP108: TERM WORK Engineering Graphics**

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<th>Sr. No.</th>
<th>Name of Practical</th>
<th>No of problems to be solved</th>
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</tr>
<tr>
<td>02</td>
<td>Projections of line (inclined to both plane)</td>
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<tr>
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<td>Projections of planes</td>
<td>04</td>
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**Term Work:** Student should submit hard copy of the above work based on the practical topics.

**MBL101: ETHICS & PROFESSIONAL COMPETENCY**  
(General Proficiency-I)

**Course objectives:**
1. To enhance and groom students’ outer and inner self to bring about positive change.
2. To develop leadership and team working abilities.

**Course Outcomes:**
Student shall be able to:
1. Demonstrate self confidence and self esteem.
2. Present appropriate etiquettes, style, manners and graceful personality.
3. Demonstrate skills of leadership and team building.

**UNIT-I Ethics:** (4 Hrs)
- Behavioural Values
- Code of Conduct in College Premises
- Addiction
- Patriotism – Building respect for the Country, National Anthem and National Flag
- Ragging
- Respect for Individuals & Environment
- Peer – Pressure & Support
- Moral Uprightness
- Importance of Altruism
- Living by the Rules

**UNIT-II Value System & Value Education:** (2 Hrs)
Understanding how value system affects behavior and perception
Difference between Values, Moral & Ethics
Concept of Equality, Acceptance, Humility
Importance of Empathy
Understanding the values in Human- Human relationship
Overview on core Human Values
Importance of Value education for College Student
Understanding the meaning of Vishwas:
- Differentiating between intention and competence
- How to resolve ethical dilemma
“Right” and “Wrong” Action

UNIT-III Copyrights, Corruption & Integrity: (2 Hrs)
Introduction
Moral Obligations
Copyright Infringement
Patent Law
Case Study Analysis

UNIT-IV Self Analysis: (2 Hrs)
The students are made aware of the concept and importance of self-analysis.
The following tools are explained along with an activity for each:
- SWOT Analysis
- JoHari Window

UNIT-V Goal Setting: (2 Hrs)
The importance and benefits of proper goal setting is explained to the students. The following topics are covered:
- S.M.A.R.T. Goals
- Principles of Goal Setting
- Steps for Goal Setting Activity

UNIT-VI Grooming & Body Language: (2 Hrs)
The students are trained on various aspects of self-grooming and body-language

UNIT-VII Attitude Development: (2 Hrs)
Types of Attitude, How society affects attitude, Importance of right attitude, Activity

UNIT-VIII Vocabulary Building, Public Speaking & Extempore: (2 Hrs)
Vocabulary Building, Crosswords, Word & Meaning, Spellings, Conversation Practice, Extempore Practice, Intonation, Speech Anxiety

UNIT-IX Making & Delivering PowerPoint Presentations: (2 Hrs)
Tips & Techniques on making effective presentation. Present with a panache, Practice Presentation, Body Language

UNIT-X Creative Thinking: (2 Hrs)
Creativity, Creative writing, Out of the box thinking, Phases of Critical Thinking, Ways to enhance creativity, Creative habits of the Mind, Brainstorming.

UNIT-XI Self Awareness & Mindfulness: (2 Hrs)
Being Self Aware, Self Awareness in relationships, SWOT, Developing Self Awareness, Self Mastery.

Books:

BAML110 APPLIED MATHS-II
Course Objectives:
1. To develop the skills to apply concepts of multiple integral and Statistics in various engineering problems.
2. To develop the skills of using Ordinary Differential Equation and its application in the field of Engineering.
3. To introduce vector calculus and its application in the field of Engineering.
4. To develop analytical skills to provide solution to simple engineering problems.

Course Outcome:
At the end of the course the student shall be able to:
1. Use of multiple integral and Statistics to formulate various engineering problems.
2. Solve engineering problems using differential equations and develop mathematical models for varied engineering applications.
3. Use of vector calculus to formulate various engineering problems.

Multiple Integral: (10 Hrs)
Elementary double integrals, change of variables, change of order of integration (Cartesian and polar), applications to mass, area, volume and center of gravity (Cartesian and polar), elementary triple integrals. Specific applications for respective branch.

Differential Equations: (10 Hrs)
First order first degree differential equations, Linear, Reducible to linear and exact differential equations (excluding the case of integrating factor), Higher order linear differential equations with constant coefficients up to method of variation of parameters.

Differential Equations (Applications): (10 Hrs)
Cauchy’s and Legendre homogeneous differential equations, Simultaneous differential equations, Special types of differential equations. Application of differential equations to electric circuits, Kinematics and vibrations (only up to second order). Specific applications for respective branch.

Statistics (10 Hrs)
Fitting of straight line, \( y = a + bx \), a parabola \( y = a + bx + cx^2 \) and exponential curves by method of least

**Vector Calculus** (8 Hrs)

**Vector Calculus (Integration)** (12 Hrs)
Vector integration, line, surface, and volume integrals. Stoke's theorem (without proof). Gauss divergence theorem, Green's theorem in plane, Green's identities and their simple applications. Specific applications for respective branch.

**Text Book:**

**Reference Books:**

**BMEP111: WORKSHOP PRACTICE**

**Course Objectives:**
1. Understand and demonstrate workshop safety regulations.
2. Use tools and processes in black smithy, fitting, carpentry and welding operations.
3. Apply knowledge of electromagnet, wind power generation, earthling and twilight system for some applications.
4. Demonstrate knowledge of component identification and PCB making.
5. Demonstrate knowledge of computer hardware and peripherals.

**1 Electronics Workshop:**
Study of electronic components and testing the components
Layout design using ORCAD tool
Steps involved in circuit design & PCB design

**2 Hardware Workshop:**
Installation of Windows and Linux Operating System
Networking, Crimping, Data Sharing in LAN Troubleshooting

**3 Machine Workshop:**
Welding: To perform job n Welding Shop
Black Smithy: To perform job in Smithy Shop
Fitting: To perform job in Fitting Shop
Carpentry: To perform job in Carpentry Shop
Sheet Metal Work: To perform job related to Sheet Metal.

**Text Book:**

**BFYP112 MINI MODELING**

**Course Objectives:**
1. To understand different phases of model development.
2. To learn various techniques of model development.

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<td>c) Metro rail/ Automobiles</td>
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<td>3</td>
<td>Ransducers and sensors</td>
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<td>a) Simulink</td>
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<td>b) Labview</td>
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<td>4</td>
<td>Energy conversion and conservation</td>
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</table>
Renewable energy sources
Energy Audit
Alternate fuels
Environmental issues related projects
Environmental Audit
Designing application based projects
PCB Fabrication
Agriculture based projects
Design of web page
Bio-Engineering

Course Outcomes:
1. Developing the skills of planning and designing to develop a working Mini Model.
2. Implement knowledge of concepts learnt and workshop practices to prepare a model.
3. Use innovative ideas and convert these into physical models.

BHUL113: COMMUNICATION SKILLS
Course Objectives:
1. To develop an understanding in the students regarding communication skills
2. To develop the four essential communication skills in students i.e. – reading, writing, listening and speaking
3. To develop the vocabulary and English proficiency of the students

Course Outcome:
At the end of the course the student shall be able to:
1. The students will develop an understanding regarding communication skills.
2. Development of the four essential communication skills in i.e. – reading, writing, listening and speaking in students.
3. Enhancement of vocabulary and English proficiency of the students.

1 INTRODUCTION TO COMMUNICATION (02 Hrs)
Importance of Communication; Importance of Communicating effectively in English; Communication Process; Channels of communication; Barriers to effective communication

2 TECHNICAL COMMUNICATION (02 Hrs)
Introduction to Technical Communication; differences between General and Technical Communication; importance of Technical Communication; Technical Communication Skills – Listening, Speaking, Reading, Writing

3 LISTENING SKILLS (06 Hrs)
Listening Process; Hearing and Listening; Poor listening habits; Traits of a good listener; Types of Listening; Barriers to Listening; Practical Exercises for Listening

4 SPEAKING SKILLS (07 Hrs)
Phonetics and Diction – Theory and Practical; Body Language; Miscellaneous tips and techniques on speaking

5 READING SKILLS (07 Hrs)
Reading Comprehension Techniques for good comprehension, Interpreting charts and tables, Practical Exercises; Developing reading speed – Theory and Practical; Loud Reading – Practical Exercises in class

6 TECHNICAL WRITING (01 Hr)
Characteristics of Technical Writing – introduction, characteristics, techniques; Choice of right words, phrases and sentences; Principles of paragraph writing

7 WRITING BUSINESS LETTERS AND EMAILS (06 Hrs)
Business Letters – The 7 Cs of Letter Writing, structure of business letters, writing business letters (applications, enquiry, quotations, complaints, cover letters); Writing professional emails

8 OTHER WRITTEN COMMUNICATION (03 Hrs)
Writing reports, proposals, press release, articles, essays; drafting of Notices and Advertisements (for newspapers); note-making

9 VOCABULARY DEVELOPMENT (02 Hrs)
Effective use of dictionary; etymology; homophones and homonyms; synonyms and antonyms; words frequently confused or misspelt, idioms and phrases

10 BASICS OF FUNCTIONAL ENGLISH GRAMMAR (03 Hrs)
Parts of Speech – introduction, prepositions; articles; tenses; narration; punctuation; voice

Books:

BHUL 414 Bio Systems in Engineering [Hrs: 25]
Course Objectives:
This course introduces general biological concepts
1. It helps students to understand importance of biological concepts in engineering fields.
2. To understand application of engineering concepts in medical instrumentation.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Use bioinstrumentation, required in cellular or molecular biology investigations
2. Apply the concepts of engineering in different streams of biomedical field.

Unit -I: Genetic Engineering (8 Hr)
Basic of biology, import aces and origin of life, introduction to subfields of biology, basic of DNA, Structure of DNA, cell types, Basic of RNA, its structure, conversion process in prokaryotes and eukaryotes. Protein Engineering, Structure of protein, level of protein, protein folding problem.

Unit –II: Human Physiology (04)
Introduction to Human Anatomy and Physiology, The Nervous System, Cardiovascular System

Unit -III: Biomedical Instrumentation (4Hr)
Bio-imaging techniques, ECG, Computer aided ECG, X-Ray, MRI, CT Scan, Blood pressure measurement instrument, spirometry

Introduction to telemetry, wireless telemetry, signal channel telemetry, temperature telemetry, remote operation, case study of various tools, overview of various project in different fields.

Unit –V: Brain Machine Interface (04)

Unit VI: Applications of Biomedical Engineering (04)

TEXT BOOKS:
2. Nega Assefa and Yosief Tsige “Human Anatomy and Physiology”.

REFERENCES
1. Teresa K. Attwood and David J. Parry-Smith “Introduction to Bioinformatics
3. M Arumugam “Biomedical Instrumentation”
## Scheme of Electronics Engineering Department
### SEMESTER - III

<table>
<thead>
<tr>
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| MBL106 | MBL 106 General Proficiency – VI Research Methodology Workshop | 2 | - | - | 2 | Compulsory Audit | - | - | - | G | - | - |
| **Total** | | 23 | - | 06 | 29 | 23 | | | | | 750 |

**Elective – I**

1. BECL401 Television Engineering
2. BECL416 Mobile Communication
3. BECL417 Sensors & Transducers
4. BECL418 Biomedical Engg
5. BECL419 Verilog HDL
6. BCSL312 Computer Graphics & Visualization

**OPEN ELECTIVES:**

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<th>S.N.</th>
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<td>1</td>
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<td>Optimization Techniques</td>
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<td>Environmental Science</td>
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<td>3</td>
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<td>Sensors &amp; Transducers</td>
<td>13</td>
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<td>Principals Business Management</td>
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<td>4</td>
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<td>Intellectual Patent Rights</td>
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<td>5</td>
<td>BHUL414</td>
<td>Bio Systems in Engineering</td>
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<td>MBEL203</td>
<td>Foundation Course in Human Resource Management</td>
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<td>6</td>
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<td>MBEL206</td>
<td>Quantitative Decision Making</td>
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<td>BMEL403</td>
<td>Reliability Engineering</td>
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<td>MBEL207</td>
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<td>10</td>
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<td>Material Science</td>
<td>20</td>
<td>MBEL209</td>
<td>Finance for Non Financials</td>
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### SEMESTER - VII

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<tr>
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**Elective-II**
1. BECL414 Optical Communication
2. BCCL308 Language Processors
3. BEECL420 PLC and SCADA
4. BEECL421 Programmable Devices & Testing
5. BECL428 Wireless Sensor Networks

**Elective-III**
1. BMEL403 Mechatronics
2. BECL415 Radar & Satellite Communication
3. BEECL422 Micro Electro Mechanical Systems (MEMS)
4. BECL424 ASIC Design
5. BEECL425 RTOS
6. BITL302 Computer Networks

### SEMESTER - VIII

<table>
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<th>Sub. Code</th>
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THIRD SEMESTER

BAML201 APPLIED MATHEMATICS – III (4-0-0-4)
Total Hrs: 45

Pre-requisite: --

Course Objectives:
1. To develop skills to use Laplace Transform and Z-Transform and its applications in the field of Electronics engineering.
2. To introduce Partial Differential Equations and Fourier Series and its applications in the field of Electronics engineering.
3. To introduce complex variables and its application in the field of Electronics engineering.
4. To develop skills to solve problems on Calculus of Variation in the field of Electronics engineering.

Course Outcomes:
1. Use Laplace and Z-Transform in solving problems of Electronics Engineering.
3. Apply concepts of complex variables and Calculus of Variation to solve engineering problems.

Unit I: Laplace Transforms (8 Hrs)

Unit II: Z-Transforms (7 Hrs)
Z transform: definition & properties, inverse Z & relation with Laplace Transform. Application to z-transform to solve difference equations with constant coefficients.

Unit III: Complex Variables (8 Hrs)
Analytic Functions, Cauchy Riemann conditions, Conjugate functions, singularities. Cauchy’s integral theorem and integral formula (Statement only). Taylor’s and Laurentz’s Theorem (Statement only). Residue theorem, contour integration.

Unit IV: Calculus of Variation (7 Hrs)
Maxima and minima of functionals, Variation and its properties, Euler’s equations, functionals dependent on first and second order derivatives, Simpler applications.

Unit V: Fourier Series and Fourier Transforms (8 Hrs)
Introduction, the Fourier theorem, Evaluation of Fourier Coefficients. Consideration of symmetry (odd, even rotational) exponential form, Fourier series, Fourier integral theorem, Fourier transforms.

Unit VI: Partial Differential Equation (7 Hrs)
Partial Differential equation of first order first degree i.e. Lagrange’s form. Linear non homogeneous Partial Differential equation of nth order with constant coefficient method of separation of variables. Application to transmission lines. Advanced topics on the subject.

Text Books:

Reference Book:
4. Chandrika Prasad, ‘Mathematics for Engineers’

BECL201 ELECTRONICS DEVICES & CIRCUITS (3-1-0-4)
Total Hrs: 45

Prerequisites: Basic Electronics
Course Objectives:
1. To gain knowledge of electronics devices and semiconductor physics.
2. To study need of electronics devices and its applications.
3. To familiarize the students with the analysis and design of analog circuits.
4. To use appropriate experimentation techniques to evaluate circuit performance.

Course Outcome:
Student shall be able to:
1. Understand the functions, operations and applications of different Diodes, BJT and CMOS Devices.
2. Apply semiconductor theories to design analog electronic circuits and investigate their performance.

3. Design and analyze oscillators, feedback and power amplifiers.

4. Acquire hands-on laboratory experience, utilizing oscilloscopes and other modern test equipments.

**Unit I: PN Junction Diode (8 Hrs)**

PN junction, forward and reverse bias, VI Characteristics, Dynamic Resistance, Temperature dependence, Avalanche and Zener Break Down, Photo Diode, LED’s, LCD’s, Varactor Diode, Tunnel Diodes, Half and full wave rectifiers with filters.

**Unit II: Bi-Polar Junction Transistors (10 Hrs)**


**Unit III: Feedback Amplifiers & Oscillators (6 Hrs)**


**Unit IV: Power Amplifier (8 Hrs)**


**Unit V: Unipolar Devices (7 Hrs)**

Field Effect Transistor, MOSFET, NMOS, PMOS Principles of operation and characteristics, Biasing arrangement, small signal analysis of CG, CB and CD

**Unit VI: CMOS Circuits (6 Hrs)**

An introduction to CMOS, Diode and MOSFET, Transistors, MOSFET Switches, Transmission Gate, Inverter - DC, AC Analysis.

Advanced topics on the subject.

**Text Books:**

1. Millman And Halkies : Electronics Devices And Circuits

**Reference Books:**

1. Kang : CMOS Integrated Circuits
2. R.J.Bekar : Fundamentals of CMOS Design
3. Theraja & Sedha : Electronics Devices And Ckts

**BECP 201 ELECTRONICS DEVICES & CIRCUITS (0-0-2-1)**

**List of Practicals:**

1. Design full wave rectifier with and without filter & calculate ripple factor.
2. Design Clipper circuit and plot the characteristics & perform simulation on Microcap.
3. Design clamper circuit and plot the characteristics & perform simulation on Microcap.
5. Design emitter follower type of voltage regulator using darlington pair and simulate it on microcap.
6. Design push-pull class A power amplifier and simulate it on microcap.
7. Design a Wein Bridge Oscillator and simulate it on microcap.
8. Design circuit to verify the characteristic of varactor diode.
10. Open Ended Experiments [Design of CMOS Inverter & NAND Gate using Tanner tool]

**BEEL201 NETWORK THEORY (3-1-0-4)**

**Prerequisite:**

**Course Objectives:**

1. To introduce the concept of circuit elements lumped circuits, circuit laws and reduction.
2. To study the loop and nodal analysis of networks in ac and dc systems.
3. To study the transient response of series and parallel A.C. circuits.
4. To study the concept of coupled circuits and two port networks.

**Course Outcomes:**

Student shall be able to:

1. Simplify circuits using mathematical tools, network theorems or network reduction approach.
2. Understand the analysis techniques of electrical networks and also synthesis of passive networks.
Unit I: Nodal & Mesh Analysis (08 Hrs.)
Nodal and Mesh analysis basic equilibrium equations, matrix approach for complicated network, containing voltage, current sources, Mutual Inductances, source transformations, Duality.

Unit II: Network Theorems (08 Hrs.)
Superposition, Reciprocity, Thevenin’s, Norton’s, maximum power transfer, compensation, Tellegen’s theorem as applied to A.C. circuits.

Unit III: Fourier Analysis (07 Hrs)
Trigonometric and exponential Fourier series. Discrete spectra and symmetry of waveforms, synthesis, steady state response of a network to non sinusoidal periodic inputs. Fourier transforms and continuous spectra.

Unit IV: Laplace Transformation (08 Hrs)
Laplace transformation and its properties, partial fractions, singularity functions, waveform synthesis. Analysis of RC & RL network with and without initial conditions with Laplace transformation, evaluation of initial & final conditions.

Unit V: Network Function (07 Hrs.)
Transient behaviors, concept of complex frequency, Driving points and transfer functions, poles, zeros of admittance function, their properties, sinusoidal response from Pole-zero locations, convolution theorem and integral solution.

Unit VI: Two Port Network (07 Hrs)
Two port network parameters and inter connections study of series and parallel resonance in A.C. Three Phase unbalanced circuits and power calculations. Advanced topics on the subject

Text Books:

Reference Books:

BECL202 COMMUNICATION ELECTRONICS (3-1-0-4) Total Hrs : 45

Course Objectives:
1. To understand the basic concept of communication and different modulation systems based on basic parameters.
2. To understand the concept of multiplexing.
3. To understand theory of digital modulation.
4. To understand working of radio receivers.

Course Outcome:
Student shall be able to:
1. Understand the fundamentals of communication systems and to perform amplitude and angle modulation and demodulation of analog signals
2. Perform and analyze PAM, PCM and PWM
3. Analyze FDM and TDM systems.
4. Design and conduct experiments, using modern communication tools necessary for various engineering applications.

Unit I: Introduction To Communication, Radiation And Propagation (8 Hrs.)
Block Schematic of Communication System, Base Band Signals and their bandwidth requirements, RF Bands, Concept of Radiation and Electromagnetic waves, Mechanism of Propagations: Ground Wave, Sky Wave, Space Wave, Duct, Tropospheric Scatter and Extraterrestrial Propagation. Concept of Fading and diversity reception, Noise Figure Calculations

Unit II: Amplitude Modulation And Detection (8 Hrs.)
AM Modulators series plate modulated class C amplifiers, efficiency & power calculations, SSB modulation SSB-SC modulation AM demodulators, square law detector, diode peak detector, envelop detector, detectors for SSB and SSB-SC-AM signals, AM using transistors, Block Diagram of AM Receiver, AM Detection : Envelope detection, Synchronous detection, Practical diode detection, AGC, SSB and DSB detection methods.

Unit III: Frequency Modulation And Radio Receivers (8 Hrs.)

Unit IV: Pulse Modulation Techniques (7 Hrs.)
Introduction to Sampling, Sampling theorems, Sampling Techniques, Analog Pulse Modulation methods, Pulse amplitude modulation (PAM), Demodulation of PAM, Transmission of PAM, Drawbacks. Pulse time
modulation: Pulse width modulation (PWM), Modulation and Demodulation of PWM, Pulse position modulation (PPM), Modulation and Demodulation of PWM.

Unit V: Digital Multiplexers (7 Hrs.)
Frequency Division multiplexing, Time Division Multiplexing. PAM/TDM System: Signaling rate, transmission bandwidth, advantages and disadvantages. Introduction to Digital multiplexers and their classification, Multiplexing Hierarchy for Digital Communication.

Unit VI: Digital Modulation Techniques (7 Hrs.)
Pulse code modulation (PCM): PCM systems, Delta modulation, ADPCM, matched filter receiver, Digital Modulation formats, Coherent Binary modulation technique, Coherent Binary: PSK, FSK, QPSK, MSK, and DPSK.

Advanced topics on the subject

Text Books:

Reference Books:
Denenis Roddy, Electronics Communication, Pearson Publication

BECP202 COMMUNICATION ELECTRONICS (0-0-2-1)
Total Hrs: 20

1. List of Practicals:
2. Generate Amplitude Demodulation using Envelope Detector and observe the result on Spectrum Analyzer.
3. Generation of Frequency Modulation and demodulation using VISIM and MATLAB.
4. Generation of Pre-emphasis and De-emphasis circuit on breadboard system & to plot pre-emphasis and de-emphasis curve.
5. To generate Pulse Amplitude Modulation (PAM) and plot the waveforms. Observe the demodulated output.
8. Verify Amplitude Shift Keying (ASK) using MATLAB
9. Generation of Frequency Shift Keying (FSK) and observation of mark and space frequencies using MATLAB.
10. Verify Pulse Code Modulation (PCM) using Simulation in MATLAB.
11. An open end project

BCSL201 DATA STRUCTURES USING C (3-1-0-4)
Total Hrs: 45

Pre-requisite: --

Course Objectives:
1. To understand the way of developing programs based on well defined approach.
2. To develop proficiency in the specification, representation, and to implement Data Types and Data Structures in C language.
3. To understand the analysis of various Algorithms.
4. To get a good understanding of applications of Data Structures in C language.

Course Outcome:
Student shall be able to:
1. Understand the Basics of structure of data using C Language
2. Develop an appropriate structure for data structure problems and analyze them for certain applications.
3. Understand advanced techniques for sorting and searching data efficiently.
4. Apply the programming and data structure concepts in C

Unit I: Arrays, Records and Pointers (7 Hrs.)
Introduction, Linear Arrays, Arrays as ADT, Representation of Linear in Memory, Traversing Linear Arrays, Inserting and deleting; Sorting; Bubble Sort, Searching; Linear Search, Binary Search, Multidimensional Arrays, Representation of Polynomials Using Arrays, Pointers; Pointer Arrays, Dynamic Memory Management, Records; Record Structures, Representation of Records in Memory; Parallel Arrays, Matrices, Sparse Matrices

Unit II: Linked List (9 Hrs)
Introduction,Linked Lists ,Representation of Linked Lists in Memory,Traversing a Linked List,Searching a Linked List, Memory Allocation; Garbage Collection ,Insertion into a Linked List ,Deletion from a Linked List , Header Linked List, Circularly Linked Lists, Two-Way Lists (or Doubly Linked Lists), Josephus Problem and its Solution, Buddy Systems

Unit III: Stacks, Queue and Recursion (9 Hrs)
Introduction, Stacks, Array Representation of Stacks, Linked Representation of Stacks, Stack as ADT, Arithmetic Expression; Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of Recursive Procedures by Stacks, Queue, Linked Representation of Queues, Queues as ADT, Circular Queues, Deques, Priority Queues, Applications of Queues.

Unit IV: Trees (10 Hrs)

Unit V: Graphs and their Applications (6 Hrs)
Introduction, Graph Theory Terminology, Sequential Representation of Graphs, Adjacency Matrix, Path Matrix, Warshall's Algorithm, Shortest Paths, Linked Representation of a Graph, Operations on Graphs, Traversing a Graph, Posets, Topological Sorting, Spanning Trees

Unit VI: Sorting and Searching (4 Hrs)
Introduction, Sorting, Insertion Sort, Selection Sort, Merging, Merge-Sort, Shell Sort, Radix Sort, Searching and Data Modification, Hashing

Advanced topics on the subject

Text Books:

Reference Books:
1. S. Sahani, Data Structures in C,
2. D. Samantha, Classic Data Structure, PHI Publications

BCSP201 DATA STRUCTURES USING C (0-0-2-1)
Total Hrs: 20

List of Practicals:
1. Write and execute a program in C to implement an array and find out greatest and smallest number from the array.
2. Write and execute a program in C to merge two sorted arrays.
3. Write and execute a program in C to implement 2-dimentional array and perform the multiplication of two matrices.
4. Write and execute a program in C to find factorial of a number.
5. Print first n numbers from Fibonacci series.
6. Write and execute a program in C to implement the Binary search algorithm
7. Write and execute a program in C to implement Insertion sort.
8. Write and execute a program in C to implement selection sort.
9. Write and execute a program in C to implement merge sort.
10. Write and execute a program in C to implement the Bubble Sort.
11. Write and execute a program in C to implement stack using arrays.
12. Write and execute a program in C to implement queue using arrays.
13. Write and execute a program in C to implement simple linked list.
14. Write and execute a program in C to insert a node in a linked list in a sorted fashion.
15. Write and execute a program in C to implement binary trees.
16. Open ended practical

MBL 102 GENERAL PROFICIENCY: -II : Foreign Language

Course Objectives:
1. To learn foreign languages to improve interpersonal skills.
2. To enable improving business communications and having access to literature in globally recognized languages.
3. To help communicate at international forums and explore opportunities for employment.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Communicate effectively in more than one globally recognized language like French, Spanish, German, Japanese, etc.
2. Interact with technical and business communities at international forums.

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<td>Pronunciations techniques</td>
<td>Worksheet and charts</td>
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<td>Greetings &amp; Salutations</td>
<td>Articles, Personal Pronoun</td>
<td>Day timing, Daily routines, forms of respects, Vocabulary</td>
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<td>Family and relations</td>
<td>Shapes and colors, Possessive Pronouns, Gender, Negative Sentence, Relations, Day of week</td>
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<td>Weather and Seasons</td>
<td>Climate, Fabrics &amp; Clothes, sizes, interrogatives, Basic verbs, Group Activities, Paragraph writing including Names of months, Seasons, Sky, Stars</td>
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<td>House &amp; Household things</td>
<td>Describing neighborhood, Present Tense, Project on vocabulary of vegetables and fruits, Bakery products, Group Activity / Role play, Plurals</td>
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<td>Visit to supermarket</td>
<td>Learning the shopping etiquettes, vocabulary of food items, conversing with shopkeepers etc., Project on vocabulary of vegetables and fruits, Bakery products, Group Activity / Role play, Plurals</td>
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<td>Timing &amp; Telephonic Conversions</td>
<td>How to Ask time, convert on a telephone, Timing and clock (Hours &amp; Minutes)</td>
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<td>Visit to city</td>
<td>Nature, Directions, Means of transportations, Tenses contd....</td>
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<td>Visit to Doctor</td>
<td>Self introductions, Role-play, preparing charts</td>
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<tr>
<td>In Restaurant/Hotel</td>
<td>Ordering eatables, Table manner, Verbs, Enhancing vocabulary of food Dishes, cutlery</td>
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<td>Visit to Doctor</td>
<td>Health matters, Illness. Commonly used verbs contd..</td>
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<td>Vocabulary of clothes, Accessories, Cuisines, Beverages, Adjectives, Presentations by students, situation based conversations</td>
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<td>Receiving Guests/Entertaining people / Good Bye’s</td>
<td>Customs, Traditions, Manners, welcome &amp; Audieu’s, Activities, Role play, Assignments</td>
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**FOURTH SEMESTER**

**BCSL202 COMPUTER ARCHITECTURE & ORGANIZATION (3-1-0-4)**

Total Hrs: 45

**Pre-requisite:** ---

**Course Objectives:** ---

1. To make the students acquainted with the organization and architecture issues of digital computers.
2. To understand the design and working of various organizational blocks.
3. To study in detail the operation of the arithmetic units, control units and the concept of pipelining.
4. To study the different ways of communicating with I/O devices and standard I/O interfaces

**Course Outcome:**

Student shall be able to:

1. Understand the basic structure and operation of a digital computer.
2. Understand different types of control and concept of pipelining and ways of communicating with I/O devices and interfaces.
3. Understand organization and design of memory. Concept, structure and operation of Cache memory and virtual memory.

**Unit I: Basic Structure Of Computers** (7 Hrs)

Functional units, Basic operational concepts, Bus structures Addressing modes, subroutines: parameter passing, Instruction formats, expanding opcodes method.

**Unit II: Basic Processing Unit** (8 Hrs)

Bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Microprogrammed Control, microinstruction format, Bit slice concept.

**Unit III: Arithmetic Unit** (8 Hrs)

Number representations and their operations, Design of Fast Adders, Signed multiplication, Booth’s Algorithm, bit-pair recoding, Integer Division, Floating point numbers and operations, guard bits and rounding.

**Unit IV: The Memory System** (8 Hrs)

Various technologies used in memory design, higher order memory design, multimodal memories and interleaving, Associative Memory, Cache memory, Virtual Memory

**Unit V: Input/Output Organization** (7 Hrs)

I/O mapped I/O and memory mapped I/O, interrupts and interrupts handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Direct Memory Access COMPUTER PERIPHERALS: I/O devices such as magnetic disk, magnetic tape, CDROM systems.

**Unit VI: RISC Philosophy:** (7 Hrs)

Text Books:

References Books:

BEEL31 POWER ELECTRONICS (4-0-0-4)
Total Hrs: 45

Pre-requisite: - Basic Electrical

Course Objectives:
1. To study characteristics of modern power electronic devices.
2. Design and application of power electronics circuits in the field of AC /DC power generation.
3. To study transmission and energy conversion using switching devices.
4. To study the design procedure for protection circuits

Course Outcome:
Student shall be able to
1. Select the device appropriate to the design for current, voltage and frequency specifications
2. Understand the design issues for solid devices based converter, inverter and chopper circuits for power applications.
3. Know and understand the harmonics, filters and PWM techniques.
4. Design the circuit for various power electronics application using semiconductor devices.

Unit I: SCR and Its Characteristics (07 Hrs.)
Gate characteristics, SCR turn off, ratings, series and parallel connections of SCRs. Triac and its applications, Uni- junction transistors, Triggering circuits and opto couplers.

Unit II: Line Commutated Converters (08 Hrs.)
Working of single pulse converter, two pulse mid point converter. three pulse midpoint converter and 3 phase six pulse bridge converter, effect of source inductance in converters, effect of tree wheeling diode.

Unit III: Single Phase And Three Phase Half Controlled Converters (08 Hrs.)
Speed control of d.c. motors using line commutated converters. Cycloconverters (single phase).

Unit IV: Static Controllable Switches (08 Hrs.)
Characteristic and working of MOSFET Gate turn off Thyristers and insulated gate bipolar transistor, protection of SCR gate circuit protection, over voltage and over current protection, snubber circuit design, converter circuit faults and their protection.

Unit V: D.C. Choppers (07 Hrs.)

Unit VI: Single Phase And Three Phase Invertors (07 Hrs.)

Advanced topics on the subject

Text Books:

Reference Books:

BEEL310 POWER ELECTRONICS (4-0-0-4)
Total Hrs: 20

List of Practicals:
1. Design a circuit to verify V-I characteristics of SCR and determine the break over voltage on state resistance holding current & Latching current.
2. Design a circuit to verify V-I characteristics of TRIAC for both forward and reverse conduction.
3. Design a circuit to verify V-I characteristics of UJT.
4. Implement a triggering circuit for SCR using UJT as Relaxation Oscillator.
5. Design a circuit and obtain output characteristics and transfer characteristics of IGBT.
6. Design series inverter using SCR and Record the frequency of operation & observe its waveforms.
7. Design a circuit for Class A commutation of a Thyristor.
8. Design a circuit to control the speed of induction motor using thyristor & Plot speed v/s α.
9. Design a circuit to control the speed of DC shunt Motor using thyristor.
10. Design a single Phase half wave converter using SCR with RC triggering.
11. Design Parallel Inverter using SCR and Record the frequency of operation & observe its waveforms.
12. Open Ended experiment

**BECL301 DIGITAL SYSTEM DESIGN (3-1-0-4)**

**Pre-requisite:** Basic Electronics

**Course Objectives:**
1. To impart fundamentals of digital system design.
2. To study system modeling using VHDL.
3. To study CPLD and FPGA Architecture.

**Course Outcomes:**
Student shall be able to:
1. Understand digital systems modeling using VHDL.
2. Write correct synthesizable System VHDL models along with test benches.
3. Design digital systems that are reconfigurable for testing.
4. Simulate and synthesize programming models for digital circuits using ISE and Quartus tools.

**Unit I: Introduction (8 Hrs)**
Introduction to VHDL, Methodologies, design units, data objects, VHDL data types, Attributes.

**Unit II: VHDL Statements and Concept of Delays. (7 Hrs)**
Concurrent and sequential statements, inertial and transport delays, delta delay, signal drivers.

**Unit III: Programming Concepts. (7 Hrs)**
Subprograms – Functions, Procedures, generic, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.

**Unit IV: Combinational System Design (8 Hrs)**
Combinational logic circuit design and VHDL implementation of following circuits – fast adder, Subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits.

**Unit V: Sequential System Design (8 Hrs)**
Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (Pseudorandom and CRC).

**Unit VI: Introduction to PLDS (7 Hrs)**
Introduction to place & route process, Introduction to ROM, PLA, PAL, Architecture of CPLD (Xilinx / Altera).

Advanced topics on the subject

**Text Books:**

**Reference Books:**
1. J Bhasker : VHDL Primer Pearson Education
3. Chales H. Roth : Digital System Design Using VHDL
5. Zainalabedin Navabbi : VHDL
6. D. Smith : VHDL

**BECP301 DIGITAL SYSTEM DESIGN (0-0-2-1)**

**Total Hrs : 20**

**List of Practicals:**
1. Design 4:1 multiplexer and write a VHDL code for same using data flow style of modeling.
2. Design Arithmetic and Logic Unit for 16 bit operation (Addition, Subtraction, Multiplication, Division, ORing, ANDing, XORing, XNORing)
3. Design BCD to seven segment decoder & display “GHRCE”.
4. Design half adder and full adder and write a VHDL code for same using dataflow style of modeling.
5. Design & write Test bench for an 8 bit adder having range 0 to 255 decimal.
6. Design 4-to-16 decoder by combining two 3-to-8 decoders and write a VHDL code for same using structural style of modeling.
7. Write a VHDL code for to design Flip-Flop (D, T, and SR) using behavioral style of modeling.
8. Write a VHDL code for 3-bit up-down counter using sequential style of modeling.
9. Design & write Test bench for an 8 bit adder having range 0 to 255 decimal.
10. Open ended :Write a VHDL code for to divide clock frequency of 50 Mhz.

BECL205 FIELD THEORY (3-1-0-4) 
Total Hrs : 45

Pre-requisite: Applied Physics

Course Objectives:
1. To study electric and magnetic fields from stationary and dynamic charge and current distributions.
2. To study and understand properties of waves its propagation and waveguides.
3. To impart the knowledge of radiations, dipoles and potentials in Electromagnetic fields.
4. To inculcate the fundamentals of Antennas and its parameters

Course Outcomes:
Student shall be able to:
1. Apply vector calculus to understand the behavior of static electric fields and static magnetic fields in standard configurations
2. Understand the concept of Maxwell’s equation for static and time varying fields.
3. Workout simplified solutions to problems of electromagnetic wave propagations, waveguides and antennas

Unit I: Electrostatics (7 Hrs)
Introduction to Cartesian,cylindrical and spherical coordinate systems.Electric field intensity, flux density, Gauss’s law, divergence,divergence theorem,Electric potential and potential gradient.

Becl302 Analog Systems & Design (3-1-0-4) 
Total Hrs : 45

Pre-requisite: Basic Electronics

Course Objectives:
1. To understand analog circuits and systems.
2. To know linear and nonlinear applications of operational amplifier ICs.
3. To study frequency response of different circuits based on operational amplifier applications.
4. To study and use different ICs such as timers for applications.

Course Outcome:
Student shall be able to:
1. Apply OPAMP fundamentals in design, evaluation and analysis of analog applications.
2. Design filters, oscillators and analog systems.
3. Develop and design analog system for linear and non linear operations.

Unit I: Operational Amplifier Fundamentals (8 Hrs)
Operational Amplifier, Basic Op-Amp Configuration, an Op-Amp with Negative Feedback, Voltage Series and Voltage Shunt Configurations, Difference amplifiers, Instrumentation Amplifier, Specification of an Op-Amp, Offset Voltages and Currents, CMRR, Slew Rate

Unit II: General Linear Applications (8 Hrs)
Constant Current Source and Voltage Source, Summing, Scaling and Averaging Amplifiers, Voltage To Current Converter with Floating And Grounded Load, Current To Voltage Converter, Integrator and Differentiator

Unit III: Structure Of Op-Amp (7 Hrs)
Differential Amplifier, Cascaded Differential Amplifier Stages and Level Translator, AC and DC Analysis of Cascade Amplifier, Design of two stage direct-coupled amplifier.

Unit IV: Active Filters And Oscillators (7 Hrs)
Classification of Filters, Active Filters, First to Sixth – Order Butterworth filter, Multiple-Feedback Filters (Band Pass And Band Reject Filters) IGMF configuration, All Pass Filter, Cascade Design Of Filters, Classification of Oscillators, Design of Op-amp based Phase Shift And Wein Bridge Oscillators, Square, Triangular And Saw Tooth Wave Generators

Unit V: Non-Linear Circuits (8 Hrs)
Schmitt Trigger, Voltage Comparator, Voltage Limiters And Window Detector, Clippers And Clampers, Peak Detector, Precision Rectifiers, Analog Switches

Unit VI: Special Ics Applications (7 Hrs)
The 555 Timer, Phase Locked Loops ICS65, ICL8038 & XR2206 Function Generator, Voltage Controlled Oscillator Basic Operation, IC based Voltage Regulator Circuits, Dual Track Voltage Regulator, Three - Terminal Regulator(Fixed Regulator) Voltage Adjustment And Current Boosting Of Fixed Regulator, Merits And Drawbacks Of Linear Regulators

Advanced topics on the subject

Text Books:

Reference Books:

BEC302 ANALOG SYSTEMS & DESIGN (0-0-2-1)
Total Hrs : 20

List of Practicals:
1. Design opamp as Adder & Differential Amplifier. Verify its simulation results on microcap.
2. Design opamp as Integrator circuit. Plot frequency response for the same. Verify its simulation results on microcap.
3. Design opamp as Differentiator circuit. Plot frequency response for the same. Verify its simulation results on microcap.
4. Design 1st order & 2nd Low Pass Filter. Plot frequency response characteristics. Verify its simulation results on microcap.
5. Design Clipper Circuit using IC 741. Verify its simulation results on microcap.
7. Design opamp as Wein Bridge Oscillator. Plot frequency response for the same. Verify its simulation results on microcap.
8. Design Square Wave Generator using IC 741. Verify its simulation results on microcap.
10. Design Low Voltage Regulator using IC 723. Simulate and observe the regulated waveform on microcap.
BECP206  MODELING & SIMULATION  (0-0-2-1)  
Total Hrs : 20

Pre-requisite: Basic Electronics

Course Objectives:
1. To select and apply appropriate simulation tools and techniques.
2. To study the modeling of systems using various tools.
3. To obtain and study the results of models designed on advanced simulation tools.

Course Outcomes:
Student shall be able to:
1. Design and Simulate the linear and non-linear based analog and digital circuits for engineering applications.
2. Apply different simulation tools for desired simulation results and apply visualization techniques to support the simulation process.

Practical List
1) Introduction of T Spice & Tanner tool
2) Design current mirror using tanner tool,
3) Design sample and hold circuit using tanner.
4) Design cascade current mirror using tanner.
6) Design Three MOSFET voltage divider using tanner
7) Design common source amplifier using tanner.
8) Design Feedback amplifiers.
9) Design a Pulse Code Modulation System using simulink
10) Digital Waveform Generation (Approximating a Sine Wave) using Simulink
11) Design of Signal processing blockset using MATLAB
12) Design of multi-order system using MATLAB and plot its time domain & Frequency domain response
13) Open Ended modeling experiments

MBL103: GENERAL PROFICIENCY-III: Hobby classes

Course Objectives:
1. To enhance the inherent qualities of oneself and provide a platform to show hidden talent.
2. To nurture one’s special capability and interest in activities like sports, drama, singing.
3. To help express oneself and be more compatible with outer world in the hobby domain.

Course Outcomes:
Student shall be able to
1. Explore and demonstrate the inherent talents within.
2. Fruitfully engage themselves in creative activities during spare time.
3. Provide logical solution as a result of hobby activity exhibited.

Course Contents:

FIFTH SEMESTER
BECL303: MICROPROCESSOR BASED SYSTEMS  
(3-1-0-4)  Total Hrs : 45

Pre-requisite: --

Course Objectives:
1. To study concepts of microprocessors family
2. To study interfacing of microprocessors with peripheral devices.
3. To understand the design of microprocessor based systems

Course Outcome:
Student shall be able to:
1. Understand the architecture and programming of processor family.
2. Understand hardware and software aspects of microprocessor based systems
3. Interface peripheral devices with microprocessors.

Unit I: Introduction to 8086 Microprocessor (07 Hrs)
Building Concepts of Microprocessor, Introduction to 16, 32, 64 bit Microprocessor, Comparison of 8086 / 8088 CPU Architecture, Microprocessor Evolution - INTEL 8086 to Pentium with focus on- Clock Speed, Concurrent operation of EU and BIU, Memory Organization & Interfacing.

Unit II: 8086 Programming (08 Hrs)
Addressing modes, Instruction set, Programming examples, Pseudo Opcodes, Assmbluer Directives. Introduction to Software and Hardware tools. [Cross assemblers, Logic analysers, Emulators, Simulators], Architecture.

Unit III: Co-processor Interfacing (07 Hrs)
8086 / 88 Maximum Mode, Architecture and Programming of 8087 and its Interfacing with 8086/8088

Unit IV: 8255 Interfacing (08 Hrs)
Interfacing and programming of Peripheral 8255, Interfacing of ADC, DAC & applications. Interfacing and programming of Peripheral 8253

Unit V: Special Peripheral Interfacing (07 Hrs)
Architecture, Interfacing and programming of Peripherals, 8251 & DMA Controllers 8237.

Unit VI: Advanced Microprocessor Study (08 Hrs)
80386 Architecture, Real and Protected Mode, Register Model, Memory Management Unit, Latest trends in microprocessors systems.
Advanced topics on the subject

Text Books:

Reference Books:

BECP303 MICROPROCESSOR BASED SYSTEMS (0-0-2-1)
Total Hrs : 20

List of Practicals:
1. To study the architecture of µc 8086 microprocessor & do some examples program
   a) Addition of two 8-bit numbers
   b) Multiplication of two 16-bit numbers
2. Write a program (WAP) to identify smallest/largest number from given string of 10 bytes data.
3. WAP to arrange a given string in ascending/descending order.
4. To write program to convert a 16 bit binary number into equivalent BCD numbers.
5. WAP to find square and cube of number
6. Write assembly program to generate Fibonacci series.
7. WAP to reverse a string from given string of 10 bytes data.
8. WAP to perform inverse of 3X3 matrix & store result in memory location
9. WAP to display "GHRCE", on monitor screen by using DOS functions.
10. Write assembly program to interface stepper motor with 8086 using dos function.
11. An open end project

BHUL301 ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT (4-0-4)
Total Hrs : 40

Pre-requisite: -- Communication Skills

Course Objectives:
1. To deal with the concepts of economics and management with and engineering perspective
2. To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modern society.
3. To cultivate the practices of independent learning on the part of the students that will prepare them to function effectively for diverse careers and lifelong learning.
4. To enable students to understand their role as engineers and their impact to society at the national and global context.

Course Outcome:
Student shall be able to:
1. Understand the interaction between engineering , business management, technological environmental spheres in modern society
2. Practice basic principles of managerial economics, accounting and financial management technique for effective business decision making

Unit I
(7 Hrs)
Demand Utility and indifference curves, Approach to Analysis of demand, elasticity of demand, Measure of demand elasticity, Factors of Production, Advertising elasticity, Marginalism

Unit II
(7 Hrs)
Laws of Return and costs, price and output determination under perfect competition, monopoly, monopolistic, competition, oligopoly, Depreciation and methods for its determination.

Unit III
(7 Hrs)
Functions of central and commercial banks Inflation, Deflation, Stagflation, Direct and Indirect Taxes,
Monetary and cycles, New economic policy, Liberalization, Globalization, Privatization, Market friendly state. Fiscal policy of the government, Meaning and phases of business.

Unit IV (6 Hrs)
Definition, Nature and scope of management, Functions of management- Planning, organizing, Directing, Controlling, Communicating

Unit V (7 Hrs)
Meaning of marketing management, Concept of marketing, Marketing Mix, Administrative and cost plus pricing, Channel of distribution, Advertising and sales promotion.

Unit VI (6 Hrs)

Advanced topics on the subject

Text Books:
2. Dr D. M. Mithani, Managerial Economics: Theory & Applications, Himalaya publication, 2008

Reference Books:

BECL304 SIGNALS & SYSTEMS (3-1-0-4)
Total Hrs : 45

Pre-requisite:
Co-requisite: Digital Communication

Course Objectives:
1. To introduce the fundamental characteristics, concept and technique of signal and systems.
2. To familiarize with time and frequency domain representation of linear systems and understanding the inter-relationship between two domains.
3. To study development of mathematical skills like Fourier series, Transforms, Random Theory are analyze using signal & System with transform techniques.
4. To familiarize with techniques suitable for analyzing and synthesizing both continuous-time and discrete time systems.

Course Outcomes:
Student shall be able to
1. Obtain a system response to standard signals and then to any signals.
2. Represent the systems in time and frequency domain using fourier transforms
3. Understand and analyze discrete time signals for information measures.

Unit I: Probability (9 Hrs)
Random process, probability, random variables, processes stationary, mean correlation covariance functions, time average and ergodicity, transmission of random process through a linear filter, spectral density, Guassian process noise, narrow band noise, envelope of sine wave plus narrow band noise.

Unit II: Linear Time-Invariant System (8 Hrs)
Different Types Of Signals; Linearity, Time Invariance And Causality; Impulse Sequence, Impulse Functions And Other Singularity Functions Time-Domain Representation And Analysis Of LTI Systems Based On Convolution And Differential Equations, Convolution Sum, Convolution Integral And Their Evaluation, Properties Of LTI Systems

Unit III: Continuous Time Fourier Transform (Ctft) (6 Hrs)
Representation Of Aperiodic Signal, Fourier Transform For Periodic Signals, Properties Of CTFT, Properties Of CTFT, Convolution Property

Unit IV: Discrete Time Fourier Transform (8 Hrs)

Unit V: Sampling (6 Hrs)

Unit VI: Information Theory (8 Hrs)
Information measures, Entropy, Chaney capacity of discrete & continuous channels,Shannon capacity of discrete & continuous channels,Shannon Hartley Theorem Huffman Coding(upto 3rd Order).

Advanced topics on the subject

Text Books:

Reference Books:
BEEL312 CONTROL SYSTEM ENGINEERING (4-0-0-4)  Total Hrs : 40
Pre-requisite: Mathematics - III
Course Objectives:
1. To impart the knowledge of fundamental concepts of control systems and mathematical modeling of the system,
2. To understand the concept of time response and frequency response of the system and to use for stability & analysis of the system
3. To study and design compensators and controllers for control systems.
4. To model systems and signal flow graph and evaluate the properties of the overall systems.
Course Outcomes:
Student shall be able to:
1. Develop the mathematical models from a given physical system and study it for obtaining time response and frequency response.
2. Learn the stability of a physical system using graphical tools such as Bode plots, Nyquist plot, Root locus etc.
3. Perform experiment on real-time systems with an objective of studying its performance, stability, controllability and observability.

UNIT I : Mathematical Modeling And Control System Components. (7 Hrs.)
Introduction to need for automation and automatic control, use of feedback, broad spectrum of system application, Mathematical modeling, (Electrical & Electromechanical) diff. Equations., transfer functions, block diagram, signal flow graphs, application to elementary systems, simplifications, effect of feedback on parameter variations, disturbance signal servomechanism and regulators, Control system components, electrical electromechanical, their functional analysis and input output representation.

Unit II : Time Response Analysis (06 Hrs.)
Time response of system, first order and second order system, standard inputs, concept of gain and time constants, Steady state error, type of control system, approximate methods for higher order system.

Unit III: Stability Of Control Systems. (06 Hrs.)
Stability of control systems, conditions of stability, characteristics equations, Routh-Hurwitz criterion, special cases for determining relative stability.

Unit IV : Root Locus Analysis (07 Hrs.)
Root location and its effect on time response, elementary idea of root locus, effect of addition of pole and zero on proximity of imaginary axis.

Unit V : Frequency Response Analysis (7 Hrs.)
Frequency response method of analyzing linear system, Nyquist and Bode Plots, Stability and accuracy analysis from frequency response, open loop and close loop frequency response, Nyquist Criterion, Effect of variation of gain and addition of pole and zero on response plot, stability margin in frequency response.

Unit VI : State Variable Techniques (07 Hrs.)
State variable method of analysis, characteristics of system state, choice of state variables, representation of vector matrix differential equation, standard form, relation between transfer function and state variables. Advanced topics on the control system.

Text Books :

Reference Books:

BEEP312 CONTROL SYSTEM ENGINEERING
List of Practicals:
1. To Plot the characteristics between position and phase of synchro transmitter
2. To measure basic step angle of stepper motor.
3. To plot speed-torque characteristics and speed vs back emf characteristics of ac servomotor.
4. To obtain the time response on a linear simulator kit.
5. To plot characteristics between the position and voltage of potentiometer.
6. To plot the graph between angular position of transmitter and receiver by using synchro transmitter and receiver pair.
7. To determine the transient response of mechanical system by using MATLAB/SIMULINK.
8. Write a program to plot root locus of a any system by using MATLAB software.
9. To find the transient response of second order RLC series circuit by using MATLAB/SIMULINK
10. Write a program to plot Bode plot of any system by using MATLAB software.
11. To implement P, PI and PID controller for a system
in MATLAB/SIMULINK
12. To determine the characteristics of positional error detector by using potentiometer

BECL403 DIGITAL COMMUNICATION (4-0-0-4)
Total Hrs : 45
Pre-requisite: Communication Electronics

Course Objectives:
1. To understand the basic knowledge of digital communication system.
2. To study the issues such as coding, multiple access, error probability, algorithms etc for analog and digital communication.
3. To impart the knowledge of design, analysis & comparison of digital communication systems.

Course Outcome:
Student shall be able to:
1. Apply knowledge of mathematics, science and engineering in the design of digital communication circuits and systems.
2. Analyze the different coding technique for design and modeling of digital communication
3. Design digital communication systems to meet predefined specifications.
4. Design and conduct experiments for testing digital communication circuits and systems.

Unit I (8Hrs)
Digital base band modulation techniques : Bandwidth of digital Data, Base band system, Formatting textual Data, Messages, characters, and symbols, Formatting Analog Information, Sources of Corruption, Uniform and non uniform quantization, Base band Modulation, Correlative Coding, Formatting analogue information.

Unit II (7Hrs)

Unit III (8Hrs)
Baseband Modulation and demodulation techniques: Digital Band pass Modulation techniques, Detection of signals in Gaussian noise, Coherent detection, Non coherent detection, Complex envelop, Error performance for Binary system, M-Ary signaling and performance, Symbol error performance for M-ary Systems, Bit error Rate calculations.

Unit IV (7Hrs)
Advanced Modulation Method Gram – Schmitt procedure, signal space representation of modulated signals nonlinear modulation methods with memory error probability and optimum receivers for AWGN channels. The signal space concept

Unit V (7Hrs)
Block and convolutional channel codes Linear block codes, generator matrix and parity check matrix, some specific linear block codes, cyclic codes, transfer function of a convolution code, optimum decoding of convolutional codes- Viterbi algorithm distance properties of binary convolutional codes

Unit VI (8Hrs)

Advanced topics on Digital Communication

Text Books:

Reference Books:

BECP305 ELECTRONIC WORKSHOP PRACTICE-I (0-0-2-2) Total Hrs: 20
Pre-requisite: ---

Course Objectives:
1. To use & analyze and identify the different types of Integrated Circuits
2. To understand the identification and computer aided design of PCB layout using different software tools.
3. To enable firsthand experience of components, their purchase, assembly, testing and trouble shooting.
4. To perform single sided and double sided PCB design using TFT machine by using a various method (Etching, Drilling, Mounting and Soldering of Components).
5. To do Mini Projects using Analog and Digital IC’s, active and passive components for Linear and Non-linear electronics circuits by organizing and managing time and resources effectively.
6. To familiarize students with modern engineering software tools and equipment to analyze Electronics and Telecommunication engineering problems

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Identify and test the electronic components used in systems.
2. Implement, design and test PCB manually and using CAD tool.

List of Practicals:
1. Study of electronics and Surface Mounting Devices (SMD) components and their identifications
2. Study of operation of CRO and Multi-meter
3. Pattern identification and working test of electronics components using CRO, Multi-meter, LCR-Q-meter.
4. Study of printed circuit board (PCB) layout designing and preparation of PCB artwork using Graph
5. Perform soldering and disordering on dot printed circuit board.
7. Preparing of PCB artwork using OrCAD.
8. Knowing various Cables, & Connectors. used in electronics system design.
10. Understand 8051 Microcontroller & downloading program using Power lab.

BECP 311 Self study :

MBL 104 : GENERAL PROFICIENCY-IV (Advanced Communication Skill)
Course Objectives:
1. To make them aware of advanced techniques of public speaking, one to one interaction and social ethics.
2. To communicate and express efficiently and assertively

Course Outcomes:
1. Apply the knowledge of phonetics and phonology to articulate speech.
2. Demonstrate ability to analyze, evaluate and summarize charts, graphs and presentations.
3. Circumvent ideas and views assertively for effective public speaking.
Outcome: By the end of the session the students will understand how to organize their thoughts very quickly and talk about the given topic.
Methodology: Each student to be given a simple topic in the session and asked to speak for 2-3 minutes in the session

Unit 7: 3 C report writing
Objective: To know about the company, its competitors and customers
Outcome: By the end of the session the students will learn how to prepare a 3 C report.
Methodology: Each student to choose a company to prepare the 3 C report by researching on all the departments of the company

Unit 8: Debate
Objective: To prepare the students on how to take a stand and present something assertively.
Outcome: By the end of the session the student will be able to understand how to disagree with each other without getting into a conflict.
Methodology: Topics to be given to teams in the previous session for preparation for and against them motion.

Unit 9: Presentation practice
Objective: To prepare the students on how to talk in front of an audience.
Outcome: By the end of the session the students will understand all about content, target audience, body language
Methodology: Topics to be given to students in the previous session and individually presented in the class for 2-3 minutes

Unit 10: Competition Sessions
Objective: To enable the students to compete with each other and prove their quality
Outcome: By the end of the sessions the students will understand healthy competition, ambition to succeed and benchmark themselves.
Methodology: Topics, evaluation sheets and short listing to be carried out before declaring the winner.

SIXTH SEMESTER

BECL306 MICROWAVE ENGINEERING (3-0-0-3)

Pre-requisite: Field Theory

Total Hrs: 45

Course Objectives:
1. To understand the concepts of microwave engineering
2. To study of microwave components, and microwave circuits.
3. To study and understand microwave test bench using Klystron amplifier and oscillator and its applications
4. To study carciotron and magnetron.

Course Outcomes:
Student shall be able to:
1. Understand and make use of microwave devices.
2. Design and implement microwave systems.
3. Analyze the designed microwave systems.
4. Analyze the S-parameter of microwave component.

Unit I: Antenna (8 Hrs)
Two elements arrays and their directional characteristics, linear arrays analysis, broadside and end fire arrays pattern multiplication, binomial arrays, design of broadest array for a specific pattern Basic principles of parabolic reflectors, analysis and power pattern, lens antennas folded dipole turnstile and Yagi antenna, log – periodic antennas horn antennas, traveling wave antennas and case grain antennas Microstrip antenna – Basic Characteristics, Feeding Methods, Method of analysis Smart Antenna : Introduction, Benefits of Smart Antennas

Unit II: Microwave Tubes (8 Hrs)

Unit III: Waveguide Components And Applications (8 Hrs)

Unit IV: Microwave Solid State Devices (8 Hrs)
Transit time limitation in transistor, microwave bipolar junction transistor, Power frequency limitation, Microwave FET, HEMT. TEDs – Introduction, Gunn diode & its modes of operation. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of operation and characteristics. Comparison, parametric amplifier

Unit V: Strip Lines & Monolithic Microwave Integrated Circuits (8 Hrs)
Microstrip lines: Introduction, Hybrid Model Analysis, characteristic impedance, losses, quality factor of Microstrip lines. Slot line and coplanar strip lines. Microstrip circuit design – Impedance transformers, Filters, Isolator and Phase-shifter, parallel strip lines, distributed lines

MMIC: Introduction, substrate materials, conductor materials, dielectric materials, resistive materials, MMIC growth, Fabrication technique, examples

Unit VI: Microwave Measurements (5 Hrs)
Advanced topics on microwave Engineering.

Text Books:
1. Monojit Mitra, Microwave Engineering

Reference Books:

BECP306 MICROWAVE ENGINEERING (0-0-2-1) Total Hrs : 20

List of Practicals:
1. To verify relationship between power & repellar voltage in Reflex Klystron
2. To verify relationship between frequency & repellar voltage in Reflex Klystron.
3. To measure and verify power distribution of E-plane and H-plane Tee & determine isolation and coupling co-efficient.
4. To verify power distribution of Magic Tee.
5. To determine coupling factor and directivity of directional coupler.
6. To determine isolation & Insertion loss of Circulator.
7. To plot standing wave ratio using Slotted line section & find out guide wavelength.
8. To determine the frequency and wavelength in a rectangular wave guide working on TE10 mode
9. To measure the polar pattern and gain of a wave guide horn antenna.
10. To plot the V-I Characteristics of the PIN diode.
11. An open end project

BCSL410 SOFT COMPUTING (3-0-0-3) Total Hrs : 45

Course Objectives:
1. To introduce the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.
2. Introduce students to soft computing concepts and techniques and foster their abilities in designing and implementing soft computing based solutions for real-world problems.
3. To familiarize with soft computing concepts.
4. To introduce the ideas of Neural networks, fuzzy logic and use of heuristics based on human experience.
5. To introduce the concepts of Genetic algorithm and its applications to soft computing using some application

Course Outcome:
Students shall be able to
1. An ability to understand the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
2. To provide the mathematical background for carrying out the optimization associated with neural network learning
3. To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations

Unit I Comparison Of Soft Computing Methods (7 Hrs)

Unit II Neural Networks (8 Hrs)
Unit III Fuzzy Set Theory (8 Hrs)

Unit IV Neuro-Fuzzy Modelling (7 Hrs)

Unit V Neuro-Fuzzy Controller In Engineering Applications (8 Hrs)

Unit VI Genetic Algorithm (7 Hrs)

Text Books:

Reference Books:
3. David E. Goldberg, Genetic Algorithm, Pearson Education

BECL404 SWITCHING THEORY & AUTOMATA (3-0-0-3) Total Hrs: 45
Pre-requisite: - Digital system Design

Course Objectives:
1. To provide adequate knowledge of Switching theory & automata
2. Students must show mastery in the three basic areas of mathematics: analysis, algebra, and topology /geometry on a basic level in lower division courses
3. To understand design of combinational logic.

Course Outcome:
Student shall be able to:
1. Conduct investigation of various techniques of switching systems and their construction especially for digital systems.
2. Design of adaptive distinguishing systems
3. Design of various logic devices

Unit I: Switching algebra and functions, Boolean algebra, Boolean functions, Minimization of Booleans function using tabulation method, sets, relation and lattices, venn diagram

Unit II: Design of combinational logic circuits, contact networks, functional decomposition and symmetric functions

Unit III: Threshold logic, threshold elements, capabilities and limitations of threshold logic, elementary properties, linear seperability, unite functions, synthesis of threshold functions, cascading of threshold elements.

Unit IV: Reliable design and fault diagnosis, fault detection in combinational circuits, fault location experiments, fault detection by Boolean differences, path, sensitizing method, multiple fault detection using map method failure- tolerant design.

Unit V: Finite state machine- Mealy and Moore synchronous sequential circuits, Design capabilities, Minimization and transformation of sequential machine, Design of fundamental mode and pulse mode circuits

Unit VI: Structure of sequential machine, lattice of closed partitions, state assignment using partitions, Reduction of output dependency, Input Independence and autonomous clock, homing sequence, synchronizing sequence, Adaptive Distinguishing experiments

Practical: Minimum 8 experiments based on above – syllabus. Practical should include experiments on fault – finding and trouble – shooting.
Advanced topics on Switching theory.

Text Books:

Reference Books:
2. Radomir S. Stanković, Jaakko Astola, From Boolean Logic to Switching Circuits and Automata, Springer
3. Adesh K. Pandey, An Introduction to Automata Theory & Formal Languages, S. K. Kataria & Sons

BECL405 DIGITAL SIGNAL PROCESSING (4-0-0-4)
Total Hrs : 45

Pre-requisite: -Signal & System

Course Objectives:
1. To study signals for different kinds of applications in general and infer information from deterministic and random signals.
2. To understand the implementation and design digital filters.
3. To analyze signals using the discrete Fourier transform.
4. To understand circular convolution, its relationship to linear convolution.

Course Outcomes:
Student shall be able to:
1. Apply theoretical and practical approach of modern signal processing in digital environment
2. Apply appropriate technique for application areas with particular stress on speech and image data
3. Apply the techniques, skills, and modern engineering tools such as MATLAB

Unit I (7Hr)
Discrete time signals and systems, classification of discrete time systems and its properties, Linear convolution, Cross Correlation, Autocorrelation of discrete signals, sampling theorem & sampling process.

Unit II (8Hr)

Unit III (8Hr)
Transform analysis of LTI system & structure for discrete – time system. Frequency response of LTI system, Relationship between magnitude & phase response, Block diagram representation & signal flow graph representation of IIR and FIR systems. Linear constant coefficient difference equations, Basic structures for IIR systems, transposed forms, basic network structures for FIR systems, lattice structures.

Unit IV (7Hr)
Filter design Techniques: Design of discrete time IIR filters from continuous time filters, Frequency transformation of low pass IIR filters, Design of FIR filters by windowing, FIR filter design by Kaiser and Hamming window method.

Unit V (8Hr)

Unit VI (7Hr)

Advanced topics on DSP

Text Books:

Reference Books:

BECP405 DIGITAL SIGNAL PROCESSING (0-0-2-1)
Total Hrs.: 20

List of Practicals:
DIGITAL SIGNAL PROCESSING
List of Practicals:
1. Write a MATLAB program to plot standard Discrete time signals (unit sample, unit step, unit ramp, exponential, sine & cosine signals)
2. Write a MATLAB program to Evaluate the linear convolution between given discrete time sequences x(n) and h(n)
3. Write a MATLAB program to perform Auto Correlation & cross correlation of the given discrete time sequences
4. Write a MATLAB program to obtain frequency response of the first order system with transfer function
   \[ H[z] = \frac{1}{(z-1)(z+0.8)} \]
5. Write a MATLAB program to verify the sampling theorem.
6. Write a MATLAB program to find the impulse response of a given system.
7. To study and verify the convolution property of Z-transform using MATLAB given that \( X_1[z] = Z+2+Z^{-1} \) and \( X_2[z] = 2Z^2+4Z+5 \)
8. Write a matlab program to design & implement IIR Butterworth filter to meet given specifications.
9. Use the partial fraction expansion method to compute the inverse Z-transform of
   \[ F[z] = \frac{1}{(1-0.5Z^{-1})(1-0.75Z^{-1})(1-Z^{-1})} \]
10. Write a matlab program to find the linear convolution using DFT and IDFT using circular convolution.
11. Open Ended Experiments:
    - To analyze the spectrum of audio signals in MATLAB.
    - To find the edges in an image data using Convolution.

BECL401 TELEVISION ENGINEERING [3-0-0-3] (Elective — I)
Total Hrs.: 45
Pre-requisite: --

Course Objectives:
1. To introduce the study and analyze of transmission & reception for audio and video systems.
2. To study the principle of monochrome and color TV.
3. To study the principle of CCTV, MATV. CATV, HDTV.
4. To study the principle of LED TV and LCD TV.

Course Outcomes:
Student shall be able to:
1. Understand the fundamental concepts of television transmitter and receiver systems.
2. Understand different color transmission and reception systems used worldwide and its compatibility
3. Trouble-shoot, test & Align television systems.

Unit I: [8 Hrs]
Brief Introduction to TV transmission and reception, Interlaced scanning, TV picture: resolution, brightness, Video Bandwidth, Line and frame wave frequency, blanking synchronizing & equalizing pulses, complete composite video signal, VSB pulses, intercarrier transmission and Reception.

Unit II: [8 Hrs]
Monochrome TV camera tubes: image Orthicon, Vidicon and Plumbicon tubes, Monochrome TV transmitter block diagram, and TV transmitting and receiving antenna.

Unit III: [8 Hrs]
Monochrome TV Receiver block diagram, Balun, RF tuner, Video IF amplifier, Video detector, Intercarrier sound system, Sound take off circuit, Sound IF and FM detector, Transistorized Keyed AGC circuit, Horizontal deflection circuits, EHT generator.

Unit IV: [7 Hrs]

Unit V: [7 Hrs]
Color signal transmission and reception, frequency interleaving, modulation of color – difference signals. PAL color TV system, choice of sub – carrier frequency, PAL color receiver, comparison of PAL with NTSCa and SECAM system.

Unit VI: [7 Hrs]
Satellite TV technology- Cable TV, digital television – Transmission and reception, projection Television – Flat panel display TV receiver, Stereo sound in TV, 3D TV, HDTV, Digital equipments for TV studios. Introduction to Plasma, LED TV Advanced topics on the subject.

Text Books:

Reference Books:

BECL416 MOBILE COMMUNICATION [3-0-0-3]
(Effectve — I) Total Hrs: 45

Course Objectives:
1. To understand the radio wave propagation and interference in mobile communications.
2. To understand the basic knowledge about the generations of mobile communication.
3. To study different architectures of mobile communication and its related parameters.
4. To impart the knowledge about applications of mobile communication

Course Outcomes:
Student shall be able to:
1. Understand the cellular systems
2. Analyze the concept of switching systems and base station subsystem

Unit I: (7 Hrs)
The cellular concept, Evolution of mobile radio communication, Cellular telephone system, frequency reuse concept, channel assignment and handoff strategies, interference and system capacity, trunking and grade of service, improving capacity in cellular system.

Unit II: (7 Hrs)
The mobile radio environment, causes of propagation path loss, causes of fading – long term and short term, definition of sample average, probability density function, cumulative probability distribution, level crossing rate and average duration of fade, delay spread, coherence bandwidth, inter symbol interference.

Unit III: (8 Hrs)
Modulation techniques and multiple access technique for mobile communication: BPSK, QPSK. Transmission and detection techniques in mobile, 4 QPSK transmission and detection techniques. QAM, GMSK Technique. Multiple access Techniques: Introduction to multiple access, FDMA, TDMA, spread Spectrum Multiple Access, Frequency Hope Multiple access (FHMA), Code Division multiple access (CDMA), Space Division Multiple access (SDMA).

Unit IV: (7 Hrs)
Equalization, diversity and channel coding: fundamentals of equalization, space polarization, frequency and time diversity techniques, space diversity, polarization diversity, frequency and time diversity, fundamentals of channel coding.

Unit V: (8 Hrs)
GSM – Global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM frame structure, signal processing GSM, introduction to CDMA, digital cellular standard. GPS Technology, GPS Receiver.

Unit VI: (7 Hrs)
Introduction to 3G: UMTS, CDMA (IS-95) Frequency and channel specification, forward CDMA channel, Reverse CDMA channel,

Advanced topics on mobile Communication and Generations

Text Books:


Reference Books:

BECL417 SENSORS & TRANSDUCERS (3-0-0-3)(Elective –I) Total Hrs.: 45

Course Objectives:
1. To impart knowledge about the measuring instruments and the methods of measurement
2. To understand different Sensors, Transducers and Bus Architectures.
3. To study and practice calibration and testing of different instrumentation systems.
4. To understand transducers types and ranges its selection for particular applications.

Course Outcome:
Student shall be able to:
1. Do error analysis associated with measurement.
2. Analyze and use the functions of various instrumentation systems.
3. Identify and Measure the sensors output for various applications.

Unit I (7 Hrs)
Generalized Instrumentation system, Active and Passive transducers, Digital and Analog mode of operation static and dynamic characteristics and performance of instruments. Stastical treatment of measurement of errors, caussian error distribution, probability tables, Combination of errors.

Unit II (7 Hrs)
Resistance type Transducers - potentiometer, strain gauge; Inductive type – LVDT; piezoelectric transducer Sensing elements: Temperature sensing elements – RTD, thermistor, thermocouple, cold junction compensation;

Unit III (8 Hrs)
Motion measurement: relative and absolute motion measurement of displacement, velocity and acceleration; Pressure sensing elements – manometers, elastic elements, Bourdon tube, diaphragm, bellows; electrical type, McLeod gauge, Pirani gauge; Flow sensing type – head meters (orifice, venturi), area meters, rotameters, electromagnetic
flowmeter, Coriolis flow meter, Ultrasonic flowmeter; pH measurement

Unit IV

Pyrometers, Piezoelectric transducer, Magnetostrictive, IC sensor, Digital transducers, Smart sensor, Fiber optic transducer, Signal conditioning techniques used in various transducers, Linearization, gain, clipping, filtering, differential amplification, shielding techniques, various standards for signal transmission like 4-20mA current loop converter etc

Unit V

Recording of data CRO, data acquisition system, Industry Standard Bus architecture: PCI Bus, ISA Bus, EISA Bus, protocols, test equipments like Multimeter, signal generator, signal analyzer

Unit VI


Advanced topics on sensor technology.

Text Books:

Reference Books:

Course Outcomes:
Student shall be able to:
1. To Understand of biomedical instruments and the analysis of biological systems
2. To analyze bioelectric signal

Unit I Introduction To Biomedical System (07 Hrs)
Introduction to Biomedical System, Man Machine Interface, Bio-electric Signals, Types of Electrodes, Electrodes for ECG, EMG, EEG, Transducers and sensors related to biomedical measurements including respiration, Skin contact impedance, Motion artifacts.

Unit II Cardiovascular System (08 Hrs)

Unit II Electrocardiography (08 Hrs)

Unit IV Laboratory Equipments (08 Hrs)

Unit V Electroencephalography (07 Hrs)
Nervous System-Anatomy, Human Brain Recording of EEG Signal, EEG Amplifier, Analysis of Diseases using EEG Electromyography

Unit VI Medical Imaging (07 Hrs)
Diagnostic Medical instruments such as CT Scan, MRI, Ultrasonic Doppler Machine, Lasers in Medicine-Vision Correction, Dermatological.

Advanced topics on Biomedical.

Text Books:
1. Cromwell, “Biomedical Instrumentation and Measurement”, PHI.
2. R. S. Khandpur, “Biomedical Instrumentation”.

Reference Books:
1. Carr and Brown, “Biomedical Instrumentation”.
2. Webster, “Application and Design of Medical Instruments”.

Course Objectives:
1. To provide adequate knowledge in Verilog HDL.
2. To understand programming technologies
3. To understand system design with PLD’s

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand the language based Digital System Modeling.

Unit I: (10 Hrs)
Introduction to Verilog, Module, delays, descriptions, Language elements, Expressions, Gate-level modeling User defined primitives, Dataflow modeling, Behaviours modeling, Structural modeling, Tasks and functions

Unit II: (6 Hrs)
Programming Technologies – ROMs & EPROMs PLA . PAL gate Arrays Programmable gate arrays and applications, Antifuse FPGA, Synthesis methods for FPGA

Unit III: (6 Hrs)
Programmable Logic Devices: Basis concept, structure of standard PLD’s, complex PLDs CPLD. Altera Max 7000 series. AMD Match 4 structure.

Unit IV: (8 Hrs)
System Design with PLD’S : Design of combinational and sequential circuits using PLD’s, Programming PAL devices, using PALASM, Design of state machines using algorithmic state machines ASM chart as a design tool

Unit V: (10 Hrs)
Introduction to FPGA: types of FPGA, Xilinx XC3000 series, Logic Cell Array (LCA), Configurable Logic Blocks (CLB), Input/Output Blocks (I/OB), Programmable interconnection Points (PIP)

Unit VI: (5 Hrs)
Introduction to ACT 2 family and Xilinx4000 families, Design example.

Advanced topics on System Modeling and Devices.

Books:

BCSL312 COMPUTER GRAPHICS & VISUALIZATION (3-0-0-3) (Elective –I) Total Hrs: 45

Course Objectives:
1. To impart basic fundamentals of computer graphics
2. To aim at developing fundamental data structures and algorithm for modeling.
3. To understand the programming in Video Games, Virtual Reality Applications, Computer Simulations, CAD and web design.
4. To impart the skills necessary for the generation of polygons and implementation of various polygon filling algorithms.

Course Outcomes:
Student shall be able to:
1. Understand basics of 2 D and 3 D computer graphics and pixel classification.
2. Understand concept of animation and visual effects with reference to workflow and technology.
3. Understand algorithms and theories that form the basis of computer graphics and visualization.

Unit-I Introduction (7 Hrs)
Introduction to Computer Graphics and Image Processing, Basic fundamentals of random scan, raster scan devices, Stereoscopic and Virtual Reality Systems, line and circle drawing algorithms

Unit-II Polygon Filling Methods (8 Hrs)
seed fill, fence fill, edge flag algorithm, scan conversion techniques, aliasing and antialiasing techniques, clipping algorithms

Unit-III Transformations (9 Hrs)
Basic 2D transformation, composite transformations-translation, rotation, scaling, reflection, shear views, windowing, Introduction to 3D transformation

Unit-IV Projections And Eliminations (8 Hrs)
Three dimensional display methods, parallel, perspective projections and types, hidden line and surface elimination techniques, shading and rendering.

Unit-V Curve Generation (8 Hrs)
Curve Generation: Cubic Spine, Braziers, B-Spline, blending of curves and other interpolation techniques, Introduction to Visualization, Applications, Visualization Techniques- parallel coordinates – a,
charts (pie chart, bar chart, histogram, function graph, scatter plot, etc., graphs (tree diagram, network diagram, flowchart, existential graph, etc.) Venn diagram Euler diagram etc

Unit-VI  Trends and Applications (5 Hrs)
Recent trends in Computer Graphics and Visualization, Advanced topics & its Application

Text Books:

MBL105 General Proficiency – V "Employability Skills & Technical Report Writing"

Course Objectives:
1. To make students communicate their knowledge and feelings with a purpose.
2. To perform effectively in one to one and group discussion meetings and in public.
3. To make students more focused for enhancing employability prospects.

Course Outcomes:
Student shall be able to:
1. Write more accurate and effective technical reports.
2. Create favorable environment for better recruitment.
3. Perform better in group discussion and interview.

Unit 1: Communication & Interpersonal Skills
Contents: Creative and innovative techniques of self introduction and practise to introduce within 30 secs and to include only relevant points. feedback will be given immediate after performance
Methodology: Script on Self- Introduction, Practising of the script

Unit 2: Tips on Aptitude Test Preparations & Cracking
Contents: Various areas/sections related to Aptitude Test
Methodology: Practising & Discussion

Unit 3: Aptitude Test Practice
Contents: Various areas/sections related to Aptitude Test
Methodology: Practising & Discussion

Unit 4: CV Making Workshop

Contents: Guiding the students to prepare the CV addressing to specific needs of the different fields and use of technical terminologies accordingly
Methodology: Workshop mode - Students to prepare the resume and immediate correction and suggestions will provided.

Unit 5: FINAL CV SOFT AND HARD COPY
Contents: Guiding the students to prepare the CV addressing to specific needs of the different fields and use of technical terminologies accordingly.
Methodology: Workshop mode - Students to prepare the resume and immediate correction and suggestions will provided

Unit 6: Tips on Aptitude Test Preparations & Cracking
Contents: Various areas/sections related to Aptitude Test
Methodology: Practising & Discussion

Unit 7: Aptitude Test Practice
Contents: Various areas/sections related to Aptitude Test
Methodology: Practicing & Discussion

Unit 8: Group Discussion
Contents: Students will be given practice of putting their points, initiating, summarising, concluding and leading the discussion. Do's & Don't's of GD, Tips & Techniques
Methodology: Interactive & Discussion Mode

Unit 9: Problem Solving Skills
Methodology: Interactive & Discussion Mode
Contents: Example & Exercise Based

Unit 10: Aptitude Test Practice
Methodology: Practising & Discussion
Contents: Various areas/sections related to Aptitude Test

Unit 11: Presentation Skills
Methodology: Verbal Presentation on a topic to specified audience, with the help of audio-visual aids
Contents: Creating effective power point presentation; using verbal communication to make your point; being prepared for likely queries

Unit 12: Presentation Skills
Methodology: Verbal Presentation on a topic to specified audience, with the help of audio-visual aids
**Contents**: Creating effective power point presentation; using verbal communication to make your point; being prepared for likely queries

**Unit 13**: Group Discussion.  
**Methodology**: Interactive & Discussion Mode  
**Contents**: Students will be given practice of putting their points, initiating, summarising, concluding and leading the discussion. Do’s & Don’t’s of GD, Tips & Techniques

**Unit 14 Personal Interview**  
**Methodology**: Simulation method with mock practise. Knowledge of Types of Interview questions - Behavioural, Competence, EQ, General and Technical  
**Contents**: Guided exercises in proper English writing, with roper use of basic grammar and punctuations etc. Stress on ability to express thoughts in a simple way.

**Unit 15**: Personal Interview  
**Methodology**: Simulation method with mock practise. Knowledge of Types of Interview questions - Behavioural, Competence, EQ, General and Technical  
**Contents**: One To One Interview with Faculty

**Unit 16**: Body Language  
**Methodology**: Script on Self - Introduction, Practising of the script, Competition on Self - Introduction.  
**Contents**: Creative and innovative techniques of self introduction and practise to introduce within 30 secs and to include only relevant points. Guidance - Dressing, Stress control and how to enter the interview room. One to one feedback will be given immediate after performance.

**Unit 17**: Aptitude Test Practice  
**Methodology**: Practising & Discussion  
**Contents**: Various areas/sections related to Aptitude Test

**MBL 106 General Proficiency - VI**  
**Research Methodology Workshop**  
**Course Objectives**:  
1. To orient the students for research in the area of interest.  
2. To provide step wise procedure for carrying out research.  
3. To introduce various mathematical, analytical and simulation tools useful for research.

**4. To learn methods for safeguarding the intellectual property rights.**  
**Course Outcomes**:  
Student shall be able to:  
1. Understand the need and importance of research.  
2. Carry out research in a scientific manner.  
3. Prepare research report and publish research findings.

**BECP 307 - Minor Project**  
**Pre-requisite**: Electronics Workshop - I  
**Course Objectives**:-  
- To provide hands on practice for Electronic application

**Course Outcomes**:-  
- An ability to work as a member of diverse technical team and to develop products

**OPEN ELECTIVE**: Below mentioned open electives are common for all the departments for sixth semester

**BECL431 FUZZY LOGIC**  
**Course Objectives**:  
1. To familiarize with Fuzzy Logic concepts.  
2. Introduce students to Fuzzy Logic concepts and techniques and foster their abilities in designing and implementing for real-world problems.  
3. To introduce the concepts of Fuzzy Logic and its applications.

**Course Outcome (CO)**  
1. Identify Fuzzy Logic technique, recognize its feasibility and apply it for particular application  
2. Effectively use existing software tool to solve real problem using a Fuzzy Logic approach  
3. Understand the idea of fuzzy sets, fuzzy logic. Use of heuristic based on human experience

**UNIT - 1 INTRODUCTION**: 6Hrs.  
Background, Crisp sets, Fuzzy sets, Properties of fuzzy sets, Representation of Fuzzy sets, Cardinality of a fuzzy set, Alpha-cuts, Special alpha cuts, Linguistic Variables, Fuzzy numbers, Interval analysis in Arithmetic, Arithmetic operations on fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equations, Max-min Method.

**UNIT - 2 CLASSICAL RELATIONS AND FUZZY RELATIONS**: 6Hrs.

UNIT - 3 CLASSICAL LOGIC AND FUZZY LOGIC: 6hrs
Classical predicate logic, Equivalence, Logical proofs, Deductive Inferences, Fuzzy logic, Approximate reasoning, Fuzzy tautologies, Contradictions, Equivalence and logical proofs, Other forms of the implication operation, Other forms of the composition operation.

UNIT - 4 FUZZY RULE-BASED SYSTEMS: 6Hrs
Introduction, Natural language, Features of the membership function, Membership value assignments, design of a fuzzy membership function, Rule-based system-canonical rule forms, Decomposition of compound rules, Formation of the control rules.

UNIT - 5 FUZZY TO CRISP CONVERSION: 6Hrs
Fuzzification, Defuzzification methods, Comparison and evaluation defuzzification methods, Mapping and relations, Functions of fuzzy sets-extension principle.

UNIT - 6 FUZZY CONTROL SYSTEM: 6Hrs
Functions of different modules in a FKBC, Design of fuzzy logic controller, Fuzzy controllers, Case studies.

Books:

BMEL 403 : RELIABILITY ENGINEERING
Objectives:
1. To provide students with a comprehensive understanding on various aspects of reliability engineering
2. To enable students to understand reliability considerations in designing machine components, elements and systems
3. To ensure sound maintenance of machines and systems and bring about reliability improvement
4. To perform reliability engineering analysis and its management throughout the product life cycle

Course outcomes:
After successful completion of this course the students will be able to:
1. Demonstrate understanding of basic reliability measures such as failure rate, availability, MTTF, MTBF, MTTR, etc.
2. Compute and evaluate reliability for redundant, series, and parallel systems
3. Develop fault trees and apply various reliability models to identify and analysis possible faults in machine systems and assess their impact on overall system reliability & maintainability.
4. Use reliability improvement techniques and undertake product testing.

Contents:
UNIT – I
Fundamental concepts of reliability, Reliability definitions, fundamental concepts of product reliability, relationship to quality control and safety, achieving reliability; Equipment survival: time dependency, probability functions, probability of survival concept, failure rate, de-rating procedure, Mean Time To Failure (MTTF), Mean Time Between Failure (MTBF), failure rate, bath tub curve, the three periods of equipment life.

UNIT – II
Reliability prediction methods, applying the Poisson distribution, series, parallel and mixed configurations, logic diagrams, probability of survival of series systems and parallel redundant systems, application of binomial distribution, series-parallel redundancy, limitations of redundant systems in standby, system reliability, reliability apportionment techniques.

UNIT – III
Reliability improvement, improvement of components, redundancy, element, unit and standby redundancy, optimization, reliability-cost tradeoff, fault tree analysis, fault tree evaluation techniques, minimal cut set method, minimal tie set method, Delphi methods, Monte Carlo evaluation.

UNIT – IV
Reliability testing, methods and types of life testing, sequential reliability testing, reliability test standard MIL-STD-781B

UNIT – V
Maintainability engineering, objectives of maintenance, types of maintenance, maintainability, factors affecting maintainability,
designing for maintainability, assuring maintainability, qualitative and quantitative maintainability requirements,

1. To learn the working process of state government.

UNIT – VI
Equipment availability, system down time, system down time, availability - inherent, achieved and operational availability, MTBF and MTTR tradeoff, MTTR prediction, reliability centered maintenance, concept of integrated logistic support, life cycle costs, maintenance engineering analysis, failure modes and effects analysis (FMEA), applications in power plants, computer systems etc.

Advanced topics on the subject.

Books:
8. B. S. Dhillon, Maintainability, Maintenance and Reliability for Engineers, CRC press.

BHUL415: CONSTITUTION OF INDIA

Course Objectives

1. To learn the working process of state government

2. It helps to grab the knowledge of union government & their powers and function.

3. It also provides clarity and idea about function of Indian constitution.

Course Outcomes

1. To study about constitution of India, this will help the students to make aware about the rights of equality, the right of freedom and the right to constitutional remedies.

2. Unit – 1 Significance of Constitution: Making of the constitution – Role of the constituent Assembly, Salient features, the Preamble, Citizenship, procedure for amendment of Constitution

3. Unit – 2 Fundamental Rights: The right to Equality, the Right to Freedom, the Right against Exploitation, the Right to Freedom of Religion, Cultural and Educational Rights, and the Right to Constitutional Remedies.


5. Unit – 4 Union Government: Powers and Functions of the President, the Prime Minister and Council of Ministers. Composition, Powers and Functions of the Parliament. Organisation of Judiciary, Jurisdiction of the Supreme Court, Independence of Judiciary


Books of My Recommendation
1. M.V.Pylee : An Introduction to the Constitution of India
2. Subhash C Kashyao : Our Constitution
3 Durga Das Basu : Introduction to the Constitution of India
4. D.C.Gupta : Indian Government and Politics
5. J.C. Johari : Indian Government and Politics
6. V.D.Mahajan : Constitutional Development and National Movement in India
8. A.P.Avasthi : Indian Government and Politics
9. S.A.Palekar : Indian Constitution
10. J.N.Pandey : Constitutional law of India

BHUL 414 Bio Systems in Engineering [Hrs: 25]

Course Objectives:

This course introduces general biological concepts
3. It helps students to understand importance of biological concepts in engineering fields.
4. To understand application of engineering concepts in medical instrumentation.

**Course Outcomes:**
Upon successful completion of the course, students will be able to
3. Use bioinstrumentation, required in cellular or molecular biology investigations
4. Apply the concepts of engineering in different streams of biomedical field.

**Unit I: Genetic Engineering** (8 Hr)
Basic of biology, import aces and origin of life, introduction to subfields of biology, basic of DNA, Structure of DNA, cell types, Basic of RNA, its structure, conversion process in prokaryotes and eukaryotes. Protein Engineering, Structure of protein, level of protein, protein folding problem.

**Unit II: Human Physiology** (04)
Introduction to Human Anatomy and Physiology, The Nervous System, Cardiovascular System

**Unit III: Biomedical Instrumentation** (4Hr)
Bio-imaging techniques, ECG, Computer aided ECG, X-Ray, MRI, CT Scan, Blood pressure measurement instrument, spirometry (4 Hr)
Introduction to telemetry, wireless telemetry, signal channel telemetry, temperature telemetry, remote operation, case study of various tools, overview of various project in different fields.

**Unit V: Brain Machine Interface** (04)

**Unit VI: Applications of Biomedical Engineering** (04)

**TEXT BOOKS:**
5. Nega Assefa and Yosief Tsige “Human Anatomy and Physiology”.

**REFERENCES**
4. Teresa K. Attwood and David J. Parry-Smith “Introduction to Bioinformatics
6. M Arumugam “Biomedical Instrumentation” Biomedical Instrumentation

**BAML301 : OPTIMIZATION TECHNIQUES (3-0-0-3)**
Total Hrs 35

**Course Objectives:**
1. To develop the skills of mathematical modeling and using Optimization techniques for various engineering problems.
2. To develop analytical skills to provide solution to simple assignment and transportation problems in the field of engineering.

**Course Outcomes:**
Shall be able to
1. Develop the mathematical problem and apply various optimization techniques.
2. Apply transportation problem & assignment problem as a decision making tool.
3. Use dynamic and nonlinear programming for optimization of various engineering problems.

**Unit 1. Linear Programming:** Formulation of a Programming Problem – Graphical solution –Simplex method (including Big M method and two phase method)- Dual problem – duality theory - dual simplex method – revised simplex method. (08 Hrs)

**Unit 2. Transportation problem – existence of solution – degeneracy- MODI method.** (06 Hrs)

**Unit 3. Assignment problem- travelling salesman problem.** (05 Hrs)

**Unit 4. Dynamic Programming:** Multistage decision process–concept of sub optimization-principle of optimality- computational procedure in dynamic Programming (06 Hrs)

**Unit 5 Application to problems involving discrete variables, continuous variables and constraints involving equations and inequalities.** (05 Hrs)

**Unit 6. Nonlinear Programming problem (NLPP):** Constrained NLPP, Lagrange’s multipliers method – convex NLPP, Kuhn – Tucker conditions. (05Hrs)

**Text Books:**

**Reference Book:**

BCEL430: ENVIRONMENTAL SCIENCE
Course Objectives:
To explain the in depth idea about the importance of environment issues for sustainable development
Course Outcomes:
Student shall be in able to ...
1. Apply the knowledge of natural resources, ecosystem, biodiversity, pollution to understand the scope and importance.
2. Understand the need of awareness on social issues in the environment and impact of human population on the environment.

Introduction:
Definition, Scope and Importance, Need for public awareness- institutions in environment, people in environment.

Unit I Natural Resources:
Renewable and non-renewable resources and associated problem
Resource utilization; Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyles. Concept of an ecosystem- understanding ecosystems

Unit II Ecosystems:
Ecosystem degradation; Structure and functions of an ecosystem- producers, consumers and decomposers.

Unit III Bio-diversity:
Introduction- Biodiversity, Species & ecosystem levels; Threats to biodiversity, Habitat loss, poaching of wildlife, man-wildlife conflicts

Unit IV Pollution:
Definition, causes, effects & control measures of air, water, soil, marine, noise & thermal pollution & nuclear hazards; Solid waste management- causes, effects, control measures of IV. Urban & industrial waste; Role of an individual & an institutions in prevention of pollution; Disaster management- Floods, earthquake, cyclone, landslides.

Unit V Social Issues in the Environment:
Unsustainable to sustainable development, urban problems related to energy; Water conservation; Rainwater harvesting, watershed management; Problems & concerns of resettlement & rehabilitation of affected people; Environmental Ethics- Issues & possible solutions

Resource, consumption patterns & need for equitable utilization, Need for gender equity; Preserving resources for future generations; The rights of animals; Climate change, Global warming, Acid rain, ozone layer depletion; Nuclear accidents; Wasteland reclamation; Consumerism & waste products; Using an environmental calendar of activities, Self initiation.

Unit VI Human Population and the Environment:
Global population growth variation among nations, Population explosion; Family Welfare Programme; Methods of Sterilization; Urbanization; Environment and Human Health- Climate and health, Infectious Diseases, Water related diseases, Risk due to chemicals in food, Cancer and environment; HIV/AIDS; Women and Child Welfare, Information Technology in environment and human health.

BECL 417 SENSORS & TRANSDUCERS (3-0-0-3)
Course Objectives:
1. To gain knowledge about the measuring instruments and the methods of measurement
2. To use different Sensors transducers and Bus Architecture.
3. To be able to calibrate and testing of different sensors
4. To differentiate between the types of transducers available
Course Outcome
Student shall be able to
1. To do error analysis associated with measurement.
2. To analyze and use the functions of various instrumentation systems.
3. To identify and Measure the sensors output for various applications.

Unit I Generalized Instrumentation system, Active and Passive transducers, Digital and Analog mode of operation, Static and Dynamic characteristics and Performance of instruments. Statistical treatment of measurement of errors, Gaussian error distribution, Probability tables, Combination of errors.

Unit II Resistance type Transducers- Potentiometer, Strain gauge; Inductive type- LVDT; Piezoelectric Transducer; Sensing elements: Temperature sensing elements- RTD, Thermistor, Thermocouple, Cold Junction Compensation.

Unit III Motion measurement: Relative and Absolute motion measurement of displacement, Velocity and Acceleration; Pressure sensing elements- Manometers, Elastic elements, Bourdon tube, Diaphragm, Bellows; Electrical type, McLeod gauge, Pirani gauge; Flow sensing type- Head meters [Orifice, Venturi], Area meters, Rotameters, Electromagnetic
Flowmeter, Coriolis Flowmeter, Ultrasonic Flowmeter; pH measurement.

**Unit IV.** Pyrometers, Piezoelectric transducer, Magnetostrictive, IC sensor, Digital transducers, Smart sensor, Fiber optic transducer, Signal conditioning techniques used in various transducers, Linearization, Gain, Clipping, Filtering, Differential amplification, Shielding techniques, Various standards for signal transmission like 4 - 20mA current loop converter etc.


**Books:**
1. Measurement system, application and design: E.D.doeblin, McGraw Hill Kogalcusha
2. Electrical & Electronic Measurements and Instrumentation: A.K. Sawhney
3. Instrumentation, measurement and feed back : B.E.Jones, McGraw hills
4. Sensors and Transducers: Patranabis D, Prentice Hall of India

**BECL430: INTELLECTUAL PROPERTY RIGHTS**

**Course Objective:**
1. To know importance of intellectual property rights for safeguarding innovations
2. To understand patentability criteria
3. To know the processing of patent applications

**Course Outcomes:**
- Student shall be able to
  1. Understand concept of intellectual property rights
  2. To know process of filing patent application
  3. To understand importance of patent information and search

**Unit I. Introduction To Intellectual Property Right**
Concept on Intellectual property right, Types of Intellectual property rights, Patents, Industrial Designs, Benefits of Industrial designs, Non-Registerable Designs, Trademarks, Benefits of Trademarks, Collective Marks, Certification Trademarks, Non-Registrable Trademarks, Geographical Indications ,Benefits of Geographical Indication, Copyrights, Legislations on intellectual property Right

**Unit II. Patentability Criteria**
Importance of Patent right, Patentibility criteria for invention, Novelty of invention, Inventions not patentable

**Unit III. Processing Of Indian Patent Application**

**Unit IV: Paris Convention And International Application Under Pct**

**Unit V. Revocation, Restoration Of Patent**
Revocation, Grounds for Revocation, Revocation of patent in Public Interest, Revocation of Patent for non-working, Restoration of lapsed patent, Right of patentees of lapsed patent

**Unit VI. Importance Of Patent Information And Search**

**Books:**
1. Teece, David J., Managing Intellectual Capital: Organizational, Strategic and policy dimensions, Oxford University Press
BMEL401 NANO TECHNOLOGY (3-0-0-3)  
Total Hrs. 36

Course Objectives:
1. To create awareness about interdisciplinary issues.
2. To create awareness regarding emerging trend for cutting edge technology.
3. Introduce students to Fuzzy Logic concepts and techniques and foster their abilities in designing and implementing for real-world problems.

Course Outcomes
Students shall be able to
1. Understand the fundamentals and basics of nanotechnology.
2. Understand significance and potential opportunities to create better materials and products.

Unit I Fundamentals And Overview Of Nanoscience (5Hrs)
Nanorevolution of the XX century, Basic concepts of Nano science and technology, Properties at nanoscale (optical, electronic and magnetic). Theory, definitions and scaling.

Unit II Different Classes Of Nanomaterials (5 Hrs)
Carbon based nano materials and other nanomaterials, Metal and Semiconductor Nanomaterials, Quantum Dots, Wells and Wires, Molecule to bulk transitions, Bucky balls and Carbon Nanotubes. Introduction to Nano composites

Unit III: Synthesis Of Nanomaterials (7 Hrs)
Top-down (Nanolithography, CVD), Bottom-up (Sol-get processing, chemical synthesis). Wet Deposition techniques, Self-assembly (Supramolecular approach), Molecular design. Microwave Synthesis of materials

Unit IV Characterization Of Nano Materials (7 Hrs)
TEM, SEM and SPM technique, Fluorescence Microscopy and Imaging.

Unit V Properties Of Nano Materials (6 Hrs)
Properties and technological advantages of nano materials in different industrial sectors such as semi conductors, sensors, nanostructured biocERamics and nanomaterials for drug delivery applications etc.

Unit VI Diversified Applications (6 Hrs)
Applications of Nanotechnology in different industrial sectors such as chemical industries, Biology and Medicines, Electrical and Electronics etc.

Advance topic on the subject

Text Book
8. Nanostructures & Nanomaterials Synthesis, Properties & Applications, Published by Imperial College Press 57 Shelton Street Covent Garden London WC2H 9HE

Reference Books

BMEL 402 UNCONVENTIONAL ENERGY SOURCES (3-0-0-3)  
Total Hrs.42

Course Objectives
1. To understand the importance of renewable energy in present energy crises.
2. To learn solar energy wind machine devices & their applications.
3. To understand biomass energy conversion techniques, fuel cell, MHD, geothermal, ocean wave energy & their applications.
To appreciate environmental and economical aspects of renewable energy sources.

Course Outcomes:
Student shall be able to
1. Understand the importance of renewable energy in present energy crisis.
2. Apply the knowledge of unconventional energy sources such as wind energy, solar energy etc in energy generation.
3. Understand energy conversion techniques to develop the system

Unit I: (8 Hrs)
Solar Energy: Energy Sources, convectional energy sources, prospects of Renewable & non-Renewable energy sources, solar radiation & its measurement, solar energy collectors, performance of flat plate, cylindrical parabolic concentric collectors, solar energy storage, applications

Unit II: (8 Hrs)

Unit III: (7 Hrs)
Energy from Biomass: Introduction, Biomass conversion Technology, biogas generation, biogas plant, materials used, site selection, fuel property of biogas, methods for obtaining biomass, gasification,

Unit IV: (7 Hrs)
Chemicals energy sources: Introduction, Fuel Cell, design & principle of operation, classification, types, applications, MHD power generation, methods, MHD design problems, status, Thermo electrical power, Thermionic generation

Unit V: (7 Hrs)
Tidal, wave and ocean thermal energy conversion plants, geothermal plants.

Unit VI: (5 Hrs)
Economical analysis of renewable energy system, problem on Economical analysis.

Advance topic on the subject

Text Book:

BITL430 : FOUNDATION COURSE IN INFORMATION TECHNOLOGY AND MANAGEMENT IT & MBA

Course Objectives:
1. To understand requirement of Information Technology in management.
2. To understand software development process, requirement role of IT in management.
3. Developing management skills using Advanced Information Technology.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand various roles of management in IT.
2. To understand various software management techniques, models etc.
3. To understand business services & quality standards of software.
4. To understand how to use various advanced Technologies for management.

Unit I. Management Perspectives:

Unit II. Software development overview
Myths about software development, Need of software engineering, Software development life cycle (SDLC), Requirement engineering, Software design, Coding software quality assurance, Reviews and testing, implementation, Post implementation review.

Unit III. Role of IT in business management:
Strategic role of IT in business and management, IT and new business models, ERP, SCM, CRM, Role of IT in decision making, IT and organization structure, IT and communication infrastructure, IT and information assurance, business continuity & disaster recovery.

Unit IV. Introduction to IT service management:
Basics of services, Service strategy planning, Service design, Service implementation, Service operations, continual service improvement, Service management processes.

Unit V. Information resource management:
Setting Strategic IT Goals, Environment Assessment, Technology Assessment, Alignment Of Business Strategy And IT Strategy, IT Architecture, IT Investment Consideration. Implementing IT/IS, Information Integrity, IT Organization Structure, IT/IT Roles, IT/IS Peoples Issues.

Unit VI Topics in IT management:
Concept Of Knowledge Management, Learning Organizations, Technology Management, Introduction To Intellectual Property Rights (IPR) & Cyber Laws, Process And Project Quality Standards, Six Sigma, CMM, CMMI, PCMM

Suggested Reading:
1. Strategic IT management, S.A.Kelkar, PHL Learning, 2010
2. IT Strategy & Management, S.S. Dubey, PHL Learning, New Delhi, 2009

Reference Books:

BPHL302: MATERIAL SCIENCE Total Hrs.35

Course Objectives:
1. Introduction to conductivity and the working as well as applications of high, low resistivity materials.
2. Demonstration of the dielectrics to solve related problems and working of related devices.
3. Familiarization of the concepts of magnetic fields and the properties of materials to obtain best applications.
4. Explanation of the concepts of MEMS, superconductivity and electroceramics.
5. Introduction of industrial lasers and solar cells material.

Course Outcomes:
Student shall be able to
1. Solve the problems related to the applications of electric fields and use related devices for engineering applications like solders fuses, cables magnetic levitation.
2. Apply the knowledge of dielectric polarization to solve related problems & applications.
3. Use of hysteresis in ferro and antiferro electric and magnetic materials for varied applications.
4. Demonstrate the knowledge of MEMS, electroceramics and lasers related to engineering and technology.

Unit I. Atomic Structure, Inter atomic Bonding and Structure of Crystalline Solids (03 Hrs)
Atomic structure, Atomic bonding in solids, Crystalline and non crystalline Materials, defects in crystal (point, line, surface defects).

Unit II Conductivity (12 Hrs)
Free electron theory of metals, Electrical Conductivity of pure metals and Alloys, Relaxation time, high conductivity materials, high resistivity materials, heating elements, fuses, switches, solders, fixed and variable resistors, Superconductivity Type I and Type II materials, High temperature superconductivity, application of superconductivity for levitation.

Unit III Dielectric properties of materials (10 Hrs)
Dielectric properties of insulators in static fields, polarization, frequency and temperature effects on polarization, dielectric loss and breakdown, ferroelectrics, Electro ceramics

Unit IV Magnetic properties of materials (07 Hrs)
Spin and orbital magnetic dipole moment of electron, ferro-, ferri-, and antiferro-magnetism, Soft and hard magnetic materials and their technology, Ferrites-Microwave applications, magnetic bubbles.

Unit V Photonic materials (03 Hrs)
Solar cells, Industrial lasers

Text Books:
1. Electrical engineering materials – A.J. Dekker, Prentis hall of India, New Delhi
3. Electrical engineering materials – S.P. Seth, Dhanpatrai publications
5. Material Science and Engineering – V. Raghavan, PHI learningpvt ltd, New Delhi
6. Electronic components and materials – Dr. M.A. Joshi, Shroff publications pvt ltd

CSEL413: GENETIC ENGINEERING

Course Objectives:
1. Explain the concept of genetic engineering and biotechnology
2. Describe the principles underlying DNA amplification and analysis
3. Explain the steps involved in cloning and expression of mammalian and plant genes in bacteria
4. Describe the various practical applications of genetic engineering and biotechnology in agriculture, industry, medicine and environmental protection

Course Outcomes
Student shall be able to
1. Understand the basic structure, specific trait of DNA, RNA, Protein.
2. Cloning the Gene that controls the trait.
3. Understand different algorithm for the DNA pattern matching, Sequences similarity.
4. Understand the various databases, with different structure for storing the large extracted data.

Unit I : Basic Genetic Engineering:
Introduction to Genetic Engineering, Importance of Genetic Engineering, Application of Genetic Engineering, Restriction Enzymes , Intron and Exon, Mutation, Cross-over, Gene Hunting

Unit II : DNA Technology
Gene expression analysis & Polymerase Chain Reaction (PCR), Nucleic acid sequences as diagnostic tools, Micro Array and Analysis, Gene Chip, DNA Finger printing, Cutting and joining DNA molecules, Principles of Electrophoresis, Agarose Gel Electrophoresis , Selective Breeding, Hybridization

Unit III DNA Sequencing and Database
Basic DNA Sequencing, Sequence analysis, Whole genome sequencing, Analyzing sequence data, chromosome walking, Jumping, Features of DNA sequence analysis, Shot gun sequencing, Homology and analogy , Orthology and paralogy, Genomics Database, Primary Database, Secondary Database, Challenges in Data Management

Unit IV Pair wise Alignments
Sub-sequences, Identity and similarity, The Dayhoff Mutation Data Matrix, The Dotplot, Global alignment: the Needleman and Wunsch algorithm, Local alignment: the Smith-Waterman algorithm

Text Book,
5. Teresa ?, Attwood and David J. Parry-Smith “Introduction to Bioinformatics” Ron Fridell “Genetic Enginnering”

MBEL201 PRINCIPLES OF BUSINESS MANAGEMENT
(3-0-0-3) Total Hrs. 30

Course Objectives
1. To understand various functions of management
2. To develop the business acumen of management
3. To understand the techniques in various management fields such as Planning, Decision Making, Co-ordination Control etc

Course Outcomes
1. The study of POM helps the students to develop the Business Acumen & understand the Techniques in various management fields such as Planning, Decision Making, Co-ordination, Control etc.
2. It helps to grab the knowledge of various functions of management
3. It also provides clarity of ideas to focus

Unit I [6 Hrs.]

Unit II [6 Hrs.]

Unit III [6 Hrs.]
Organisation – Concepts, Importance, Principle of organization, Features of good organization structure, Types of Organisation structure, Authority and Responsibility – Authority, Responsibilities and Accountability, Delegation of Authority, Barriers to Effective Delegation, Span of control

UNIT IV

Coordination & Direction – Importance, Need, Principles of Coordination, Methods of Achieving Effective Coordination, Meaning, Importance and Principles of Direction, Characteristics of Good Directives

UNIT V

Control – Concept, Planning-Control Relationship, Process of Control – Setting Objectives, Establishing Standards, Measuring Performance, Correcting Deviations. Brief Review of Traditional Techniques & Modern Techniques of Control, Human Response to Control, Dimensions or Types of Control - (a) Feed Forward Control (b) Concurrent Control (Real Time Information & Control), (c) Feedback Control v) Techniques of Control.

Books Recommended

MBEL202 FOUNDATION COURSE IN MARKETING MANAGEMENT (3-0-0-3 Total Hrs. 30)

Course Objectives
1) To develop the acumen for marketing management.
2) To understand the Techniques in Marketing Management such as Marketing Plan, Market Analysis, Product Management, Strategies, Services, etc.
3) To understand the basic practices of marketing management.

Course Outcomes
1. The study of Marketing Management helps the students to develop the acumen for marketing management.
2. It also makes them aware about the techniques in marketing management.
3. It provides basic understanding of different practices followed by marketers


UNIT II


UNIT III

Marketing Communication – Understanding Communication Process, Managing Advertising; Sales promotion, Public Relations and Direct Marketing. Distribution Channels, Types of Channels, Importance of Retailing and wholesaling

UNIT IV

Relationship Marketing & E-business – E-Business, Relationship marketing, Database Marketing, Globalization, Consumerism

UNIT V

Monitoring and Controlling Marketing Efforts – Need and Importance of Marketing Control, Types of Controlling-Operating Control, Strategic Control, Marketing Audit

Books recommended

MBEL203 FOUNDATION COURSE IN HUMAN RESOURCE MANAGEMENT(3-0-0-3) Total Hrs. 30

Course Objectives
1) To understand the Basics of HRM.
2) To understand the Framework of HRM.
3) To learn the functions of HRM.

Unit I

Uses, Process and Methods of Collecting Data for Job Analysis, Job Description, Job Specifications, Factors affecting Job Design, Techniques of Job Design

Unit-II (06)

Unit-III (06)

Unit-IV (06)

Unit-V (06)

Course Outcome :
1. The study of Human Resource Management helps the students to understand the Basics of HRM & the Framework of HRM.
2. It helps to understand HR functions
3. It also helps to understand performance appraisal and employ benefits.

Books Recommended


MBEL204 BUSINESS LEGISLATION (3-0-0-3)
Total Hrs. 30
Course Objectives
1. To develop acumen towards various acts required in Business Activity.
2. To create basic knowledge of business law
3. To study IP and other laws related to business world

Course Outcome :
1. It helps to understand the various laws and regulations required in corporate world.
2. It provides basic idea about companies’ act 1956
3. It also provides knowledge of Indian contract act 1872

Unit-I (05)

Unit-II (09)

Unit-III (06)

Unit-IV (04)
Intellectual Property Act – Scope, Provisions & overview

Unit-V (06)
Books Recommended:

1. **Bare Acts** – Govt. or Private publication

**MBEL205 FOUNDATION COURSE IN ACCOUNTING (3-0-0-3)**

**Course Objectives**
1. To develop Accounting Skills.
2. To Understand the Techniques in Accounting.
3. To Undergo Computer skills required in Accounting

**Course Outcomes**
1. Through this course students get acquainted with the language of accounting and develop in them the ability to evaluate and use accounting data as an aid to decision making.
2. The main purpose is to assist the students in developing skills in problem solving and decision making in the financial area.
3. It helps students to understand the functionalities of accounting

**Unit-I** *(08)*


**Unit-II** *(08)*


**Unit-III** *(05)*

**Cost Volume Profit Analysis, EVA and Performance Measurement**

**Unit-IV** *(05)*

**Performance Evaluation Techniques** – Introduction to Budgeting and Budgetary Control, Classification of Budget, Problems on Flexible and Cash Budgets, Responsibility Accounting.

**Unit-V** *(04)*

**Applications** – Overview of Control in Banking and Non-Banking Finance, Service Industry, Transnational Companies, Project management and PSE

Books Recommended
2. **Management Control System** by Sekhar, TMH, New Delhi
4. **Management Accounting, Principles & Practice** by Sharma R.K & Gupta S.K
5. **Management Control System** by Robert N. Anthony, TMH, New Delhi

**MBEL206 QUANTITATIVE DECISION MAKING (3-0-0-3)**

**Total Hrs. 30**

**Course Objective**
1. To develop quantitative decision making skills
2. To understand the techniques applied in QDM
3. To make students understand decision making process

**Course Outcomes**
1. The study of Quantitative Decision Making helps the students to develop quantitative decision making skills.
2. It makes them aware about the Techniques applied in QDM
3. It helps students to learn about various methods of decision making

**Unit-I** *(07)*

**Measures of Central Tendency** – Arithmetic Mean, Median, Mode, Comparison of Mean, Median and Mode, Measures of Dispersion – Range, Quartile Deviation, Mean Deviation, Standard Deviation, Relative Dispersion, Coefficient of Variance, Regression and Correlation Analysis Regression: Method of Least Squares, Regression Coefficient, Standard Errors of Estimate. Correlation: Types, Graphical and Algebraic Method, Coefficient of Determination, Rank Correlation

**Unit-II** *(06)*

**Time Series Analysis and Forecasting** – Components of Time Series, Trend, Seasonal Variation, Cyclic
Variation and Irregular Variation, Forecasting.

Unit-III

Unit –IV
LPP - Simplex Method –Formulation and Construction of Initial Basic Table by Simplex Method and its interpretation, Theoretical Concept of Duality and Sensitivity.

Unit-V
Vogel’s Approximation Method (VAM).Optimization by Modified Distribution Method (MODI). LPP – Assignment – Formulation and Solution

Books Recommended:
2. Quantitative Techniques in Management, N. D. Vohra (TMH)
3. Quantitative Methods For Business, Anderson (Thomson Learning Books)
4. Statistical methods, S.P. Gupta (S Chand)
5. Levin Richard & Rubin David – Statistics for Management (Prentice Hall of India)

MBEL207 FINANCIAL MANAGEMENT (3-0-0-3)
Total Hrs -30
Course Objectives
1) To create awareness about budgeting.
2) To understand the techniques & tools used in financial management.
3) To create awareness about budgeting.

Course Outcome:
Student shall be able to
1. The student should be capable to apply appropriate Capital Budgeting Techniques.
2. The student should be able to apply appropriate Capital Structure and Dividend Policy for optimal risk return trade-off.
3. The student should be capable of applying Cost of Capital for deciding the Capital Structure
4. The student should be capable of applying different Working Capital policies to improve liquidity and profit

UnitI

UnitII
Sources of financing – LONG TERM: Shares, Debentures, Term Loans, Lease & Hire Purchase, Retained Earnings, Public Deposits, Bonds (Types, features & utility) SHORT TERM: bank finance, commercial paper & trade credit & bills discounting INTERNAL: Retained earnings, Depreciation policies.

UnitIII
Capital structure – Concept, Meaning, Principles & Importance, Cost of Capital, Cost of Different Sources of Finance, Weighted Average Cost of Capital, Theories of Capital Structure, Concept of Optimal Capital Structure, Computation of Leverages, Cost of Capital and EBIT-EPS analysis.

UnitIV

UnitV

Books Recommended
1. Financial Management by Ravi Kishore, Taxmann’s.

MBEL209 FINANCE FOR NON FINANCIALS (3-0-0-3)
Total Hrs. 30
Course Objectives
1. To develop Skills on Financial and Accounting
2. To Understand the Techniques in financing & Accounting.
3. To create awareness about the financial terminology.

**Course Outcome:**
Student shall be able to
1. The student should be able to understanding Finance and accounting
2. The student should be capable of analyzing and interpretation of financial statement
3. The student should be able to apply appropriate financial and accounting Knowledge to make effective decisions.

**Unit I** [6 Hrs]

**Unit II** [5 Hrs]

**Unit III** [6 Hrs]
Instruments of Financial Markets-Introduction to common shares, preference shares, debentures, hybrid instruments like convertibles, warrants, money market instruments like CPs, bank financing, factoring, forfeiting, bill discounting etc. Comparative analysis of various sources of funds - competitive advantages and disadvantages. Discussion on authorized capital, subscribed capital, issued capital, paid up capital etc.

**Unit IV** [7 Hrs]

**Unit V** [6 Hrs]
Introduction to Financial Markets- Capital Markets and Money Markets, Distinctive advantages and disadvantages, Major players, Their roles in the market Products, How to raise funds through the Primary Market (capital and money market), How the secondary markets operate both money and capital markets.

**References:**
2. Finance for Non-Finance Executives Prasanna Chandra
3. Finance & Accounting for Non-Financial ManagersSamuel Weaver, J. Fred Weston
4. How to Read A Cash Flow StatementN Ramachandran, Ram Kumar Kakani
5. Finance for Non-Financial Managers and Small Business Owners Lawrence W. Tuller

**SEVENTH SEMESTER**

**BECL406 CMOS VLSI DESIGN** (3-0-0-3)
Total Hrs: 45

Pre-requisite: Analog System Design

**Course Objectives:**
1. To study fundamental concepts in VLSI systems design.
2. To understand computer-aided techniques used in the design verification of VLSI systems using CMOS technology
3. To study evaluation procedure and the performance parameters of CMOS designs
4. To learn different processing technologies used for VLSI design.

**Course Outcome:**
Students shall be able to
1. Understand knowledge required to design, implement and test VLSI circuits through CMOS technology.
2. Integrate the VLSI circuits for complex.

**Unit I:** (8 Hrs)
Review of MOS devices, MOS transistor models. PMOS, NMOS, CMOS

**Unit II:** (8 Hrs)
CMOS Inverter- Basic electrical properties & ckt concepts: The NMOS inverter & transfer characteristics, pull up & pull down ratios of NMOS, alternative forms of pull up the CMOS inverter & transfer characteristics CMOS inverter delays

**Unit III:** (7 Hrs)
Study of CMOS logic- Combination logic, gates, Compound gates, Multiplexers, memory elements. Static & Dynamic logic ckt s, Domino & Zipper logic
Unit IV: (8 Hrs)
Circuit characterization and performance, resistance and capacitance estimation, switching characteristics, power dissipation

Unit V: (7 Hrs)
CMOS processing technology - basic CMOS technology, layout design rules, stick diagram representation, latch up.

Unit VI: (7 Hrs)
CMOS circuit and logic design – transistor sizing, fan in, fan out, physical design of simple logic gates, CMOS logic structures, clocking strategies.
Advanced topics on Transistor design

Text Books:

Reference Books:

BECL409 DIGITAL IMAGE PROCESSING (4-0-0-4)
Total Hrs: 45

Pre-requisite:
Course Objectives:
1. To study the basic theory & algorithms used in digital image processing
2. To expose students to current technologies and issues those are specific to image processing systems.
3. To understand and study the issues like segmentation, transforms etc used for the image processing.
4. To understand MATLAB tool boxes and their uses for applications of image processing.
Student shall be able to
1. Understand the basics of digital image processing
2. Understand and analyze algorithms for digital image processing
3. Design and implement algorithms for applications of digital image processing.

Unit I:
Origins of digital image processing, Various Imaging techniques, components of an image processing system, Image sensing and acquisition, Image sampling and quantization, neighbors of a pixel, Adjacency, Connectivity, Regions and boundaries.

Unit II:
Basic intensity transformation and spatial filtering, Image negatives, log transforms, power-law transformations, median filtering, Histogram equalization, Histogram matching spatial correlation and convolutions

Unit III:
Two-dimensional orthogonal and Unitary Transforms, properties of unitary transforms 2D-DFT, Cosine transforms, Sine transforms, Hadamard transform, Haar transforms, Slant transforms.

Unit IV:
Model of image Degradation/Restorations process, Noise models, Restoration in the presence of noise only, periodic noise reduction by Frequency domain filtering, Image reconstruction from Projections, Image compression models, Huffman coding, LZW coding, Run length coding, Bit-plane coding.

Unit V:
Some basic morphological algorithms, Boundary extraction, convex hull, thinning, skeletons, morphological Reconstruction. Color image processing, color models, RGB color models, CMY and CMYK color models the HSI color models.

Unit VI:
Image segmentation, Fundamentals, Point, Line and edge detection, of segmentation, Thresholding, Region-based segmentation, watershed segmentation algorithm Applications of segmentation.
Advanced topics on Image processing technology and algorithms.

Text Books:

Reference Books:

BECP409 DIGITAL IMAGE PROCESSING (0-0-2-1)
Total Hrs: 20

List of Practicals:
1. To Read image from MATLAB tool box.
2. To adjust GRAY LEVEL of image by using MATLAB tool box.
3. To study Brighten of Darken image by using MATLAB tool box.
4. To adjust CONTRAST of an image by using MATLAB tool box.
5. To study INTENSITY of transform image by using MATLAB tool box.
6. To change the enhancement of an image using Histogram.
7. To remove salt and pepper noise by using filter.
8. To study the Gaussian noise from image by using adaptive filter.
9. To study Rayleigh noise Distribution on the image by using MATLAB.
10. Edge detection using sobel & prewitt operation.
11. Open Ended experiments

BECL410 EMBEDDED SYSTEMS (4-0-0-4)
Total Hrs: 45

Pre-requisite: Microprocessor Based System

Course Objectives:
1. To study and understand various embedded systems.
2. To understand the design parameters of embedded systems applications.
3. To study and impart different tools for embedded system design.

Course Outcome:
Student shall be able to
1. To understand structure and programming of microcontrollers.
2. To design & implement microcontroller based embedded systems.
3. To use software and hardware tools for embedded system design.

Text Books:

Unit I: (8 Hrs)

Unit II: (7 Hrs)
8051 Instruction Set, Addressing modes & programming. 8051 Timers, Serial I/O

Unit III: (8 Hrs)
Memory Interfacing. Programming, Real time interfacing with LED, LED display, LCD display

Unit IV: (7 Hrs)
RISC Controller : ARM Micro-controllers – overview; features, ARM 7 –architecture, Thumb, Register Model, Addressing modes, Instruction set.

Unit V: (8 Hrs)
Real-time Versus Conventional Software, Software Engineering Issues, Study of Embedded OS-Win CE, RTLINUX

Unit VI: (7 Hrs)
Industrial Interfacing Buses: PCI, ESA, EISA, I2C, USB, RS232.

Advanced topics on embedded system

Reference Books:

BECP410 EMBEDDED SYSTEMS (0-0-2-1)
Total Hrs: 20

List of Practicals:
1. Study of Microcontroller tools
2. Write a program to perform arithmetic Operation using 8051 Microcontroller.
3. Write a program to perform addition of two arrays using 8051 Microcontroller
4. Write a program to perform Array Sorting
5. Write a program to perform Interrupt Operation
6. Write a program to interface with LED Display
7. Write a program to perform arithmetic Operation using PIC Microcontroller
8. Write a program to perform addition of two arrays using PIC Microcontroller
9. Write a program to perform arithmetic operation using ARM7 Microcontroller
10. Write a program to perform addition of two arrays using ARM7 Microcontroller
11. Write a program in C for interfacing the Display using PIC Microcontroller
12. Open Ended Mini Project

Elective-II (3-0-0-3)
BECL414 OPTICAL COMMUNICATION
BCSL308 LANGUAGE PROCESSORS
BEEL420 PLC & SCADA
BECL421 PROGRAMMABLE DEVICES & TESTING
BECL428 WIRELESS SENSOR NETWORKS (E-II)

Elective-II (3-0-0-3)
BECL414 OPTICAL COMMUNICATION (3-0-0-3)
BECL414 OPTICAL COMMUNICATION (E-II) Total Hrs:48

Course Objectives:
1. To understand the basic concepts of fiber optical Communication.
2. To understand photonic systems, modulation formats and multiplexing technologies
3. To study and understand optical switching and fiber optical measurement.

Course Outcome:
Student shall be able to
1. Analyze and Understand Terabit per second optical communication systems and associated technologies
2. Select, design and implement appropriate technologies for the implementation of optical fiber systems.
3. Perform experiments on optical communication set

Unit I: (8 Hrs)
Overview of Optical fiber Communications, Principle of optical communication – Attributes and structures of various fibers such as step index, graded index mode and multi mode fibers. Propagation in fibers – ray mode, Numerical aperture and multi path dispersion in step index and graded index fibers. Material dispersion and frequency response. Self phase modulation, combined effect of dispersion and self phase modulation.

Unit II: (08 Hrs.)
Electromagnetic wave equation in step index and graded index fibers modes and power flow in fibers. Manufacture of fibers and cables, fiber joints, splices and connectors.

Unit III: (08 Hrs)

Unit IV: (06 Hrs)
Optical sources – LED and laser diode, principles of operation, concepts of line width, phase noise, switching and modulation characteristics – typical LED and LD structures.

Unit V (08 Hrs.)
Photo detector – Pn detector, pin detector, avalanche photodiode – Principles of operation, concepts of responsivity, sensitivity and quantum efficiency, noise in detection.

Unit VI: (08 Hrs.)

Advanced topics on Optical Communications

Text Books:

Reference Books:

BCSL308: LANGUAGE PROCESSORS (3-0-0-3)
Pre-requisite: --

Course Objectives:
1. To provide adequate knowledge in Language processors
2. To understand syntax analysis.
3. To gain knowledge of code optimization
4. To understand storage allocation & error handling

**Course Outcomes:**
Upon successful completion of the course, students will be able to
1. Understand practical issues in designing language processors, code and design.
2. Implement language processors in C/C++.

**Unit I** (8 Hrs)
Introduction to Compilers: Compilers and translators, Phases of compiler design, cross compiler, Bootstrapping, Design of Lexical analyzer, LEX.

**Unit II** (7 Hrs)
Syntax Analysis: Specification of syntax of programming languages using CFG, Top-down parser, design of LL (1) parser, bottom up parsing technique, LR parsing algorithm, Design of SLR, LALR, CLR parsers.

**Unit III** (8 Hrs)
Syntax directed translation: Study of syntax directed definitions & syntax directed translation schemes, implementation of SDTS, intermediate notations: postfix, syntax tree, TAC, translation of expression, controls structures, declarations, procedure calls, and Array reference.

**Unit IV** (7 Hrs)
Storage allocation & Error Handling: Run time storage administration, stack allocation, symbol table management, Error detection and recovery: lexical, syntactic, semantic.

**Unit V** (8 Hrs)

**Unit VI** (7 Hrs)
Recent trends in Language Processor. Advanced topics & its Application

**Text Books:**
1. Steven Bird, Ewan Klein & Edward Loper, Natural Language processing with python, O'Reilly Media Final Release, June 2009

**Reference Books:**
1. Daniel Jurafsky and James H. Martin, Speech and Language Processing, Prentice Hall, Englewood Cliffs, New Jersey 07632
2. Daniel Jurafsky and James H. Martin, Principles of Programming Languages, Kadambri Agarwal

**BEEL420 PLC & SCADA (3-0-0-3) (E-II)**
Total Hrs: 45

Pre-requisite: --

**Course Objectives:**
1. To develop understanding and application skills for the programming of PLCs.
2. Demonstrate knowledge of systems associated with PLCs
3. Demonstrate and apply knowledge of PLC hardware/software concepts

**Course Outcomes:**
Student shall be able to
1. Understand PLC controllers and SCADA systems
2. Develop application skills for programming.

**Unit I;** (07 Hrs)
Introduction: Introduction to automation tools PLC, DCS, SCADA, Hybrid DCS/PLC.

**Unit II;** (07 Hrs)
Data acquisition systems, Evolution of SCADA, Communication technologies, Monitoring and supervisory functions, SCADA applications in Utility Automation, Industries.

**Unit III;** (07 Hrs)
SCADA System Components: Schemes- Remote Terminal Unit [RTU], Intelligent Electronic Devices [IED], Programmable Logic Controller [PLC], Communication Network, SCADA Server, SCADA/HMI Systems.

**Unit IV:** (08 Hrs)
SCADA Architecture: Various SCADA architectures, advantages and disadvantages of each system - single unified standard architecture -IEC 61850

**Unit V:** (08 Hrs)
SCADA Communication: various industrial communication technologies -wired and wireless methods and fiber optics. open standard communication protocols

**Unit VI** (08 Hrs)

Latest developments in PLC & SCADA.

**Text Books:**
1. Gary Dunning, Introduction to Programmable logic Controllers, Delmar Publisher, 2006
2. Webb & Reis, Programmable logic Controllers, Prentice Hall of India, 2003

Reference Books:

BECL421 PROGRAMMABLE DEVICES & TESTING (E-II) (3-0-0-3) Total Hrs: 45

Pre-requisite:

Course Objectives:
1. To give sufficient background for understanding programmable devices
2. To give knowledge of system design
3. To make aware students to test devices and find out fault in the system

Course Outcome:
Upon successful completion of the course, students will be able to
1. Model complex system and to implement of logic programmable devices.
2. Design system
3. Find fault in the system.

Unit I: (8 Hrs)
Programmable Logic Devices: Basic concept, Programming technologies, Programmable logic elements, programmable logic array, programmable array logic, structure of standard PLD’s, complex PLD’s CPLD, Altera Max 7000 series, AMD Mach 4 structure

Unit II: (8 Hrs)
System Design with PLD’s : Design of combinational and sequential circuits using PLD’s, Programming PAL devices using PALASM, Design of state machines using algorithmic state machines ASM chart as a design tool.

Unit III: (8 Hrs)
Introduction to FPGA: types of FPGA, Xilinx XC3000 series, Logic Cell Array (LCA), Configurable Logic Blocks (CLB), Input/Output Blocks (I/OB), Programmable Interconnection Points (PIP), Introduction to ACT 2 family and Xilinx4000 families, Design example

Unit IV: (7 Hrs)
Fault Testing in Digital Circuits: Detection and Location of fault in combinational logic circuit, Path sensitizing method, Boolean difference method, Fault detection and location in synchronous sequential circuit, Design for testability, built in self-test

Unit V: (7 Hrs)
Fault Tolerant system: Fault avoidance and fault tolerance, technique for fault tolerance, Hardware fault tolerance.

Unit VI: (7 Hrs)
Static, Dynamic and Hybrid redundancy, fault tolerance in memories, software fault tolerance, design for fault tolerant software.

Advanced topics on Programming Devices.

Text Books:

Reference Books:

BECL428 WIRELESS SENSOR NETWORKS (E-II) (3-0-0-3) Total Hrs : 45

Pre-requisite:

Course Objectives:
1. To learn the basics of wireless sensor network
2. To understand the concepts of ad-hoc and sensor networks, their applications and typical node and network architectures.
3. To study protocol design issues (especially energy-efficiency) and protocol designs for wireless sensor networks
4. To understand the applications of WSN

Course Outcomes:
Student shall be able to
1. Analyze and explain the concept of ad-hoc and sensor networks, their applications and typical node and network architectures.
2. Design and explain protocols for wireless sensor networks.

Unit I: (8 Hrs)
Introduction – motivation, applications, sensors, architectures, platforms for WSN, Actual Systems - Berkeley motes, TinyOS and nesC.

Unit II: (8 Hrs)
How to program actual WSN. Wireless Radio Realities – radio irregularities and impact on protocols, MAC protocols – B-MAC, multi-channel MAC, Routing.
Unit III: (8Hrs)
Directed Diffusion, Clock Synchronization, Localization – TDOA, Walking GPS, range free solutions

Unit IV: (7Hrs)
Power Management – per node, system-wide, sentry services, sensing coverage, Data Services and Databases – architectures, queries (SQL),

Unit V: (7Hrs)
Data dissemination, Programming Abstractions – programming models, EnviroTrack, new APIs Security and Privacy – problems, attacks, solutions.

Unit VI: (7Hrs)
Case Study: A Complete System – surveillance and tracking application
Advanced topics on WSN.

Text Books:

Reference Books:
2. Walteneagus Dargie, Christian Poellabauer, Fundamentals of wireless Sensor Networks,

BECP 408 : Project Phase-I: Project Seminar
Pre-requisite: Minor Project

Course Objectives:-
1. To understand and study the process of literature review and to put forward the findings.
2. To get the detailed practical knowledge about latest technology by designing any system or prototypes by using acquired technical knowledge and skills.

Course Outcome:-
1. Effective use, interpret the literature and data for the cause of project execution.
2. Use of acquired technical knowledge to solve any problem.
3. Present, prepare and deliver the seminar as a team member.

Elective-III (3-0-0-3)
[1] BMEL403 Mechatronics

[3] BECL422 MEMS
[4] BECL424 ASIC Design
[5] BECL425 RTOS
[6] BITL 302 Computer Networks

BMEL403 MECHATRONICS (3-0-0-3)( E-III)
Total Hrs: 45

Pre-requisite:

Course Objectives:
1. To impart and demonstrate how mechatronics integrates knowledge from different disciplines in order to realize engineering and consumer products.
2. To understand continuous-time control design using software, for the manipulation, transmission, and recording of data.
3. To study parameters of actuators and sensors their suitability for applications.

Course Outcome:
Student shall be able to
1. Select suitable actuators, sensors and transducer and integrate them with embedded systems.
2. Implement a continuous-time control design using software
3. Demonstrate how Mechatronics integrates knowledge from different disciplines in order to realize engineering and consumer products that are useful in everyday life.

Unit I [7 Hrs]
Need and scope of the subject recent trend of designing machine units along with electronic circuits for operation and supervision of mechanisms. Techniques of interfacing mechanical device with computer hardware and development of software for driving them.

Unit II [8 Hrs]
Basic principles and specific applications of armature and field and control of D.C. Motors, Variable voltage and variable frequency control of 3 phase and single phase Induction motors, speed control of Synchronous motors. Different types of stepper motors, hold on torques and position control of stepper motors.

Unit III [8 Hrs]
Common and commercial Ics used for amplification, timing and digital indication. Different types of actuators, working of synchro transmitter and receiver set, pair of P/I, pressure to current and I/P type for pneumatic position control, Electrical and hydraulic servomotors. Design of AC and DC solenoid plungers and pressure and force amplification devices.
Unit IV  [7 Hrs]
Adon cards for sampling and actuation, 4-20 MA ports, AD-DA Conversion, Peripheral interface organization, general layout of data bus and data transfer through serial and parallel modes of communication, schemes of computer networking and hierarchy in supervisory control.

Unit V  [8 Hrs]
Working of integrated systems by using combined block diagrams. Study of systems used in Ink Jet Printers, Photo copying, Washing Machines. IC Engine fuel injection system etc.

Unit VI  [7 Hrs]
General philosophy of Artificial Neural Network simulations. Fuzzy logic for operation and control of mechatronic systems.

Advanced topics on Mechatronics

Text Books:
1. Horacio Martinez-Alfaro, Mia Devic, Janeza Trdine 9, Advances in Mechatronics, Rijeka, Croatia

Reference Books:
1. Ganesh S. Hegde, Mechatronics, Jones & Bartlett Learning, 2010

BECL415  RADAR & SATELLITE COMMUNICATION. (3-0-0-3) (E-III)
Total Hrs: 45

Pre-requisite:
Course Objectives:
1. To impart working principles and concepts of radar and satellite communication system.
2. To impart knowledge of different components in Radar and satellite communication.
3. To understand the orbital aspects and components of a satellite communication system.
4. To study the link budget of a satellite communication system and study of satellite orbits and launching.

Course Outcome:
Student shall be able to
1. Acquire the expertise in specialized areas of RADAR Engineering
2. Acquire the technical competence in specialized areas Satellite Communication.
3. Understand the spacecraft subsystems and satellite earth station technologies

Unit-I  (8Hrs)
RADAR Range Equation, CW and FM modulated RADAR, MTI and Pulse Doppler RADAR, Tracking RADAR.

Unit-II  (8Hrs)
RADAR antennas, parabolic reflector, Scanning field reflector, Lens antennas.
RADAR Receivers, Displays and Duplexer, Detection of RADAR; signals in noise.

Unit-III  (8Hrs)
RADAR clutter, Effects of weather on RADAR, Detection of targets in Precipitation, Synthetic Aperture RADAR, HF over the Horizon RADAR.

Unit-IV  (7Hrs)
Introduction: Origin of Satellite communication, Current state of satellite communication. Orbital aspect of satellite communication: Orbital mechanism, equation of orbit, locating satellite in orbit, orbital elements, and orbital perturbation. Space craft subsystem: Attitude and orbit control system, Telemetry tracking and command power system, and communication subsystem. Satellite link design: System noise temperature and T / T ratio, down link design, domestic satellite system, uplink design, design of satellite link for specified (C / N).

Unit-V  (7Hrs)
Propagation on satellite: Earth’s path – propagation effects, atmospheric absorption, Scintillation effects, Land and Sea multipath, Rain and ice effects, Rain drop distribution, calculation of attenuation. Rain effects on Antenna noise temperature.

Unit-VI  (7Hrs)
Earth Station technology: Earth Station design; antennas tracking, LNA, HPA, RF multiplexing, factors affecting orbit utilization, tracking, equipment for earth station.

Advanced Study on Radar Technology

Text Books:

Reference Books:

BECL422  MEMS (MICRO-ELECTRO-MECHANICAL SYSTEM) (3-0-0-3) (E-III)  Total Hrs : 45

Pre-requisite: --
Course Objectives:
1. To study functionality of Micro Electro Mechanical systems
2. To understand design of sensors and actuators.
3. To impart the knowledge of interfacing mechanical systems with computer and electronics systems.

Course Outcome:
Student shall be able to
1. Use materials for common micro-components and devices.
2. Choose a micromachining techniques for designing of MEMS,
3. Get introduced to RF based MEMS modules are used in automobiles, aerospace technology, biomedical applications, ink jet printers, wireless and optical communications.

Unit I: (08Hrs)
An introduction to Microsensors and MEMS, Evolution of Microsensors & MEMS, Microsensors & MEMS applications.

Unit II: (08Hrs)
Microelectronic technologies for MEMS, Micromachining Technology, Surface and Bulk Micromachining, Micromachined.

Unit III: (08Hrs)
MEMS sensors and actuators, Micro sensors, Mechanical, Inertial, Biological, Chemical, Acoustic,

Unit IV: (07Hrs)
Microsystems Technology, Integrated Smart Sensors and MEMS, Interface Electronics for MEMS.

Unit V: (07Hrs)
MEMS Simulators, MEMS for RF Applications.

Unit VI: (07Hrs)
Bonding & Packaging of MEMS, RF MEMS, and Optical MEMS.

Advanced topics on MEMS.

Text Books:

Reference Books:

BECL424 ASIC DESIGN (3-0-0-3) (E-III)
Total Hrs: 45

Pre-requisite:

Course Objectives:
1. To study the need and requirements of application specific integrated circuits
2. To understand different techniques of application specific integrated circuits
3. To impart a thorough understanding of the concepts of design of application specific integrated circuits.

Course Outcomes:
Student shall be able to
1. Evaluate the need for application specific integrated circuit
2. Distinguish different techniques of design of application specific integrated circuits.

Unit I: (15 Hrs)
Design flow – Economics of ASICs – ASIC cell libraries – CMOS logic cell data path logic cells – I/O cells – cell compilers.

Unit II: (10 Hrs)
Transistors as resistors – parasitic capacitance – logical effort programmable ASIC design software: Design system – logic synthesis.

Unit III: (10 Hrs)
Half gate ASIC, Low level design entry: Schematic entry – low level design languages – PLA tools – EDIF – An overview of VHDL and Verilog.

Unit IV: (10 Hrs)

Text Books:

Reference Books:

BECL425 RTOS (3-0-0-3)(E-III)
Total Hrs: 45
Pre-requisite: ---

Course Objectives:
1. To understand the characteristics and issues in real time operating systems
2. To study the timing requirements of real-time systems
3. To understand the different architectures and design specifications of real time operating systems and real time applications.
4. To impart hard and soft real-time systems
5. To describe scheduling algorithms for hard real-time systems

Course Outcome:
Student shall be able to
1. Identify the functions of operating system
2. Evaluate the need for real-time operating system and Distinguish a real-time system from other systems
3. Implement the real-time operating system principles

Unit I: (8 Hrs)

Unit II: (8 Hrs)

Unit III: (7 Hrs)
DECLARATIVE SPECIFICATIONS: Regular Expressions and Extensions, Traditional Logics-Propositional Logic, Predicates, Temporal logic, Real time Logic.

DETERMINISTIC SCHEDULING: Assumptions and Candidate Algorithms, Basic RM and EDF Results, Process Interactions- Priority Inversion and Inheritance.

Unit IV: (8 Hrs)

Timer Application, Prosperities of Real and ideal clocks, Clock Servers – Lamport’s Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization- Centralized Synchronization, Distributed Synchronization.

Unit V: (7 Hrs)

Unit VI: (7 Hrs)
OPERATING SYSTEMS: Real Time Functions and Services, OS Architectures-Real Time UNIX and POSIX, Issues in Task management- Processes and Threads, Scheduling, Synchronization and communication. Advanced topics on RTOS

Text Books:
1. Richard Barry, Using the free RTOS Real Time Kernal (Standard Edition), Paperback, 172 pages Published January 1st 2010 by Real Time Engineers Ltd (Standard Copyright License)
2. By Chowdary Venkateswara Penumuchu, Simple Real-time Operating System, Publisher: Trafford Publishing (7 August 2007)

Reference Books:
2. Qing Li, Caroline Yao, Real-Time Concepts for Embedded Systems, Published by CMP Books an imprint of CMP Media LLC.

BITL302 COMPUTER NETWORKS (3-0-0-3) (Elective-III) Total Hrs: 45
Pre-requisite: --

Course Objectives:
1. To understand the computer network architectures.
2. To make aware of design and performance perspective of network architectures.
3. To discuss current trends in communication

Course Outcome:
Student shall be able to
2. Analyze and implement computer network

Unit-I:Introduction (9Hrs)
The use of computer networks. Network hardware. LAN’s, Man’s, WAN’s, internet works, Network software, protocol hierarchies, design issues for layers, interfaces and services, Connectionless oriented and connectionless services, service
primitives, relationship of Services to protocols, the OSI reference model, TCP/IP reference model, comparison of OSI And TCP/IP reference model.

Unit-II: Physical Layer (8 Hrs)
The theoretical basis for data communication-Fourier analysis, bandwidth-limited signals, Maximum data rate of a channel, transmission media-magnetic media, and twisted pair coaxial Cable, fiber optics. Wireless transmission, microwave transmission. Multiplexing, switching, Narrow and ISDN - services, architecture, interface, perspective on N-ISDN, broadband ISDN & ATM-virtual circuits versus circuit switching, transmission in ATM networks, ATM Switches.

Unit-III: Data Link Layer (8 Hrs)
Design issues - services provided to the network Layer, framing, error control, flow control, Error correcting & detecting codes, elementary data link protocols, simplex stop and wait Simplex protocols for noisy channel, sliding window protocols-one bit protocol, go back Protocol, selective repeat protocol. The medium access sub layer - static and dynamic channel Allocation in LANs and MANs, Multiple access protocols - ALOHA. CSMA, collision free Protocols, limited contention protocols, IEEE 802.11 wireless LAN protocols, IEEE Standards 802 for LAN and MANs-802.3 & Ethernet, token bus. Token ring,

Unit-IV: The Network Layer (9 Hrs)
Design issues, services provided to the transport layer, internal organization, comparison of Virtual circuit and datagram subnets, routing algorithms. Optimality principle, shortest path Routing, flooding, flow-based routing, distance vector routing, link state routing, hierarchical Routing, broadcast & multicast routing, congestion control algorithms, general principles Prevention policies, traffic shaping. flow specifications, congestion control in virtual circuit Subnets. choke packets, load shedding, jitter control. IP protocol, IP address. Subnets, internet Control protocols, OSPF. BGP.

Unit V: Transport and Application Layer (8 Hrs)
Transport and Application Layer - services provided to the upper layer, Quality of Service, Transport service primitives, elements of transport protocols, addressing, establishing a Connection, releasing a connection, flow control & buffering, multiplexing, crash recovery

Unit VI: Trends And Applications (3 Hrs)
Bluetooth protocol stack, Bluetooth connections, piconets and scatternets, WiFi and WiMAX Standard Recent trends and advanced topics.

Text Books:


Reference Books:

Semester VIII
BECP 411 - Project Internship (Phase-II)
Total Hrs: 30

Course Objectives :-
1. To provide opportunity for working on projects, prepare a prototype and conclusions in the form of reports.
2. To provide opportunity for selection of projects considering their usability to the industry and society with environmental aspects.
3. To undertake innovative and research based projects.

Course Outcomes:-
The student shall able to
1. Work as a member of diverse technical team and to develop the projects/ products.
2. Interpret results of experimentation to present the conclusions.
## SCHEME OF B.E. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)

*TAE will be based on Home Assignment, Seminar, Quiz, Surprise Test, Group Discussion, Debate, General Behavior & Attendance

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## BEEL 312: Control System Engineering

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## MBL105: General Proficiency – V

### Audit Course

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## MBL106: General Proficiency – VI

### Audit Course

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### Total

| Total | 22  | 6   | 28  | 120 | 120 | 360 | 750 |

## Elective – I

- BCSL312: Computer Graphics & Visualization, BECL427: Communication Protocol Design
- BECL406: CMOS VLSI Design, BECL417: Sensors & Transducers

## OPEN ELECTIVES:

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<td>3</td>
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<td>7</td>
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<td>8</td>
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<td>9</td>
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## SCHEME OF B.E. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)

*TAE will be based on Home Assignment, Seminar, Quiz, Surprise Test, Group Discussion, Debate, General Behavior & Attendance*

<table>
<thead>
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**Elective –II**
BECL409 DIGITAL IMAGE PROCESSING
BECL424 APPLICATION SPECIFIC INTEGRATED CIRCUITS DESIGN
BMEL403 MECHATRONICS
BECL428 WIRELESS SENSOR NETWORKS
BECL415 RADAR & SATELLITE COMMUNICATION

**Elective-III**
BMEL420 ROBOTICS
BECL422 MICROELECTROMECHANICAL SYSTEMS (MEMS)
BECL425 RTOS
BECL416 MOBILE COMMUNICATION
BEEL420 PLC & SCADA

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THIRD SEMESTER

BAML201 APPLIED MATHEMATICS – III [4-0-0-4]  
Total Hr. [ 60 Hrs ]

Course Prerequisite:  Applied Mathematics-I (BAML101) Applied Mathematics-II (BAML102)

Course Objectives:
1. To develop skills to use Laplace Transform and Z-Transform and its applications in the field of Electronics and Telecommunication engineering.
2. To introduce Partial Differential Equations and Fourier Series and its applications in the field of Electronics and Telecommunication engineering.
3. To introduce complex variables and its application in the field of Electronics and Telecommunication engineering.
4. To develop skills to solve problems on Calculus of Variation in the field of Electronics and Telecommunication engineering.

Course Outcomes: student shall be able to
1. Use Laplace and Z-Transform in analyzing Electronics and Communication systems.
3. Apply concepts of complex variables and Calculus of Variation to solve engineering problems.

Course Content:

Unit I: Laplace Transforms: (10 Hrs)

Unit II: Z-Transforms: (10 Hrs)
Z transform: definition & properties, inverse z & relation with Laplace Transform. Application to z-transform to solve difference equations with constant coefficients.

Unit III: Complex Variables: (10 Hrs)
Analytic Functions, Cauchy Riemann conditions, Conjugate functions, singularities. Cauchy’s integral theorem and integral formula (Statement only). Taylor’s and Laurent’s Theorem (Statement only). Residue theorem, contour integration.

Unit IV: Calculus of Variation: (10 Hrs)
Maxima and minima of functionals, Variation and its properties, Euler’s equations, functionals dependent on first and second order derivatives, Simpler applications.

Unit V: Fourier Series and Fourier Transforms (10 Hrs)
Introduction, the Fourier theorem, Evaluation of Fourier Coefficients. Consideration of symmetry (odd, even rotational) exponential form, Fourier series, Fourier integral theorem, Fourier transforms.

Unit VI: Partial Differential Equation: (10 Hrs)
Partial Differential equation of first order first degree i.e. Lagrange’s form. Linear non-homogeneous Partial Differential equation of nth order with constant coefficient method of separation of variables. Application to transmission lines.

Text Books:

Reference Books:

BECL 201 ELECTRONIC DEVICES & CIRCUITS [3-1-2-5] Total Hr.:[60 Hrs]

Course Prerequisite: Applied Physics (BPHL102), Basic Electronics (BPHL105)

Course Co-requisite: Network Theory(BEEL201)

Course Objectives:
1. To gain knowledge of electronics devices and semiconductor physics.
2. To study need of electronics devices and its applications.
3. To familiarize the students with the analysis and design of analog circuits.
4. To use appropriate experimentation techniques to evaluate circuit performance.

Course Outcomes:
At the end of the course the student shall be able:
1. Understand the functions, operations and applications of different Diodes, BJT and CMOS Devices.
2. Apply semiconductor theories to design analog electronic circuits and investigate their performance.
3. Design and analyze oscillators, feedback and power amplifiers.
4. Acquire hands-on laboratory experience, utilizing oscilloscopes and other modern test equipments.
Course Content:

Unit I: PN JUNCTION DIODE  (10 Hrs)
PN junction, forward and reverse bias, VI Characteristics, Dynamic Resistance, Temperature dependence, Avalanche and Zener Break Down, Photo Diode, LED’s, LCD’s, Varactor Diode, Tunnel Diodes, Half and full wave rectifiers with filters.

Unit II: BI-POLAR JUNCTION TRANSISTORS  (10 Hrs)

Unit III: FEEDBACK AMPLIFIERS & OSCILLATORS  (10 Hrs)

Unit IV: POWER AMPLIFIER  (10 Hrs)

Unit V: UNIPOLAR DEVICES  (10 Hrs)
Field Effect Transistor, MOSFET, NMOS, PMOS Principles of operation and characteristics, Biasing arrangement, small signal analysis of CG, CB and CD

Unit VI: CMOS Circuits  (10 Hrs)
An introduction to CMOS, Diode and MOSFET, Transistors, MOSFET Switches, Transmission Gate, Inverter - DC, AC Analysis. Advance topics on the subject.

Text Books:

Reference Books:

BECP 201 ELECTRONIC DEVICES & CIRCUITS
Total Hrs : 20

LIST OF EXPERIMENTS:
1. To calculate ripple factor of full wave rectifier with and without filter.
2. To plot the characteristics of clipper circuit & to perform simulation on Micro-cap.
3. To plot the characteristics of clamper circuit & to perform simulation on Micro-cap.
4. To design Zener Diode as a Voltage Regulator & to perform simulation on Micro-cap.
5. To design a transistor shunt voltage regulator
6. To design emitter follower type of voltage regulator using darlington pair and simulate it on microcap.
7. To design pushpull class A power amplifier and simulate it on microcap.
8. To design class AB audio power amplifier and simulate it on microcap.
9. To design Hartley oscillator and simulate it on microcap.
10. To design a Wein Bridge Oscillator and simulate it on microcap.
11. To design RC Phase Shift Oscillator and simulate it on microcap.
12. To plot the drain & transfer characteristics of FET in CS mode & to perform simulation on micro-cap.
13. To verify frequency response of single stage RC coupled amplifier & to perform simulation on microcap.
14. To design a CMOS inverter using microwind.
15. Open Ended experiments

BEEL201 NETWORK THEORY (3-1-0-4)
Total Hr.:[ 60 Hrs. ]

Course-Prerequisite: Basic Electrical (BEEL106)
Course-Co requisite: Electronic Devices & Circuits (BECL 201), Applied Mathematics – III (BAML201)

Course Objectives:
1. To introduce the concept of circuit elements lumped circuits, circuit laws and reduction.
2. To study the loop and nodal analysis of networks in ac and dc systems.
3. To study the transient response of series and parallel A.C. circuits.
4. To study the concept of coupled circuits and two port networks.

Course Outcomes:
At the end of the course the student shall be able to:

1. Simplify circuits using mathematical tools, network theorems or network reduction approach.
6. Understand the analysis techniques of electrical networks and also synthesis of passive networks

Course Content:

Unit I :Nodal & Mesh Analysis (10 Hrs.)
Nodal and Mesh analysis basic equilibrium equations, matrix approach for complicated network, containing voltage, current sources, Mutual Inductances, source transformations, Duality.

Unit II :Network Theorems (12 Hrs.)
Superposition, Reciprocity, Thevenin’s, Norton’s, maximum power transfer, compensation, Tellegen’s theorem as applied to A.C. circuits.

Unit III :Fourier Analysis (10 Hrs.)
Trigonometric and exponential Fourier series. Discrete spectra and symmetry of waveforms, synthesis, steady state response of a network to non sinusoidal periodic inputs. Fourier transforms and continuous spectra.

Unit IV :Laplace Transformation (10Hrs.)
Laplace transformation and its properties, partial fractions, singularity functions, waveform synthesis. Analysis of RC & RL network with and without initial conditions with Laplace transformation, evaluation of initial& final conditions.

Unit V : Network Function (10 Hrs.)
Transient behaviors, concept of complex frequency, Driving points and transfer functions, poles, zeros of admittance function, their properties, sinusoidal response from Pole-zero locations, convolution theorem and integral solution.

Unit VI :Two Port Network (08 Hrs.)
Two port network parameters and inter connections study of series and parallel resonance in A.C. Three Phase unbalanced circuits and power calculations. Advance topics on the subject

Text Books:

Reference Books:

BECL202 COMMUNICATION ELECTRONICS (3-1-2-5) Total Hr.:[60 Hrs.]

Course-Prerequisite :Basic Electronics (BPHL105)
Frequency Rejection, IFRR, Tracking, De-emphasis, Mixers.

Unit IV: PULSE MODULATION TECHNIQUES (10 hrs.)
Introduction to Sampling, Sampling theorem, Sampling Techniques, Analog Pulse Modulation methods, Pulse amplitude modulation (PAM), Demodulation of PAM, Transmission of PAM, Drawbacks. Pulse time modulation: Pulse width modulation (PWM), Modulation and Demodulation of PWM, Pulse position modulation (PPM), Modulation and Demodulation of PWM.

Unit V: DIGITAL MULTIPLEXERS (10 hrs.)
Frequency Division multiplexing, Time Division Multiplexing. PAM/TDM System: Signaling rate, transmission bandwidth, advantages and disadvantages. Introduction to Digital multiplexers and their classification, Multiplexing Hierarchy for Digital Communication.

Unit VI: DIGITAL MODULATION TECHNIQUES (10 hrs.)
Pulse code modulation (PCM): PCM systems, Delta modulation, ADPCM, matched filter receiver, Digital Modulation formats, Coherent Binary modulation technique, Coherent Binary: PSK, FSK, QPSK, MSK, and DPSK. Advance topics on the subject

Text Books:

Reference Books:

BECP202 COMMUNICATION ELECTRONICS
LIST OF EXPERIMENTS: (30 Hrs)
2. Generation of Amplitude Modulation using transistor BC 548 and Calculate modulation index. Perform simulation in MATLAB.
3. Generate Amplitude Demodulation using Envelope Detector and observe the result on CRO and Verify using MATLAB.

4. Generation of FM using IC XR-2206 and calculate modulation index and Verify the results using MATLAB
5. Generation of Pre-emphasis and De-emphasis circuit on breadboard system & to plot pre-emphasis and de-emphasis curve.
6. To generate Pulse Amplitude Modulation (PAM) and plot the waveforms and Verify results using Microcap.
7. Generation of Pulse Width Modulation (PWM) signal using IC 555 on breadboard and Verify results using Micro-cap.
9. Verify Amplitude Shift Keying (ASK) using MATLAB
10. Generation of Frequency Shift Keying (FSK) and observation of mark and space frequencies using MATLAB.
11. Verify Pulse Code Modulation (PCM) using MATLAB Simulink
12. To perform Phase Shift keying (PSK).
13. To perform Quadrature Phase Shift keying (QPSK).
14. To perform Delta modulation and observe the waveforms.
15. To observe the slope overload errors of Delta modulation.
16. Open Ended experiments

BECSL201 DATA STRUCTURES USING C [3-1-2-5]
Total Hr.: [60 Hrs.]

Course-Prerequisite: Basics of Computing (BITL104)

Course Objectives:
1. To understand the way of developing programs based on well defined approach.
2. To develop proficiency in the specification, representation, and to implement Data Types and Data Structures in C language.
3. To understand the analysis of various Algorithms.
4. To get a good understanding of applications of Data Structures in C language.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand the Basics of structure of data using C Language
2. Develop an appropriate structure for data structure problems and analyze them for certain applications.
3. Understand advanced techniques for sorting and searching data efficiently.
4. Apply the programming and data structure concepts in C
Course Content:

Unit I: Arrays, Records and Pointers (10 Hrs)
Introduction, Linear Arrays, Arrays as ADT, Representation in Memory, Traversing Linear Arrays, Inserting and deleting, Sorting; Bubble Sort, Searching; Linear Search, Binary Search, Multidimensional Arrays, Representation of Polynomials Using Arrays, Pointers; Pointer Arrays, Dynamic Memory Management, Records; Record Structures, Representation of Records in Memory; Parallel Arrays, Matrices, Sparse Matrices

Unit II: Linked List (10 Hrs)
Introduction, Linked Lists, Representation of Linked Lists in Memory, Traversing a Linked List, Searching a Linked List, Memory Allocation, Garbage Collection, Insertion into a Linked List, Deletion from a Linked List, Header Linked List, Circularly Linked Lists, Two-Way Lists (or Doubly Linked Lists), Josephus Problem and its Solution, Buddy Systems

Unit III: Stacks, Queue and Recursion (10 Hrs)
Introduction, Stacks, Array Representation of Stacks, Linked Representation of Stacks, Stack as ADT, Arithmetic Expression, Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of Recursive Procedures by Stacks, Queue, Linked Representation of Queues, Queues as ADT, Circular of Queues, Deques, Priority Queues, Applications of Queues

Unit IV: Trees (10 Hrs)

Unit V: Graphs and their Applications (10 Hrs)
Introduction, Graph Theory Terminology, Sequential Representation of Graphs, Adjacency Matrix, Path Matrix, Warshall’s Algorithm, Shortest Paths, Linked Representation of a Graph, Operations on Graphs, Traversing a Graph, Posets, Topological Sorting, Spanning Trees

Unit VI: Sorting and Searching (10 Hrs)
Introduction, Sorting, Insertion Sort, Selection Sort, Merging, Merge-Sort, Shell Sort, Radix Sort, Searching and Data Modification, Hashing

Text Books:

Reference Books:

BCSP201 DATA STRUCTURES USING C
Total Hrs: 20

LIST OF EXPERIMENTS:
1. Write and execute a program in C to implement stack using arrays
2. Write and execute a program in C to implement queue using arrays
3. Write and execute a program in C to implement simple linked list
4. Write and execute a program in C to implement stack using linked list
5. Write and execute a program in C to implement queue using linked list
6. Write and execute a program in C to implement doubly linked list
7. Write and execute a program in C to implement circular linked list
8. Write and execute a program in C to reverse a singly and doubly linked list
9. Write and execute a program in C to insert a node in a linked list in a sorted fashion
10. Write and execute a program in C to implement binary tree, finding the depth of a tree
11. Write and execute a program in C to implement inorder, preorder and postorder traversals
12. Write and execute a program in C to find if two trees are identical
13. Write and execute a program in C to implement graph using linked list
14. Write and execute a program in C to implement bubble sort and selection sort using menu driven program
15. Write and execute a program in C to implement merge sort
16. Open ended practical

MBL 102 GENERAL PROFICIENCY:II : Foreign Language
For syllabus please refer electronics department syllabus in third semester.

FOURTH SEMESTER

BEEL310 POWER ELECTRONICS (4-0-2-5)
Total Hr.: [60 Hrs.]

Course-Prerequisite : Basic Electrical (BEEL106), Basic Electronics (BPHL105), Electronic Devices & Circuits (BECL201), Applied Mathematics–III (BAML201)
Course-Co requisite: Analog Systems And Design (BECL302)
Course Objectives:
1. To study characteristics of modern power electronic devices.
2. Design and application of power electronics circuits in the field of AC/DC power generation.
3. To study transmission and energy conversion using switching devices.
4. To study the design procedure for protection circuits.

Course Outcomes:
At the end of the course the student shall be able to:
1. Select the device appropriate to the design for current, voltage and frequency specifications.
2. Understand the design issues for solid devices based converter, inverter and chopper circuits for power applications.
3. Know and understand the harmonics, filters and PWM techniques.
4. Design the circuit for various power electronics application using semiconductor devices.

Course Content:
Unit I: SCR and Its characteristics: (10 Hrs.)
Gate characteristics, SCR turn off, ratings, series and parallel connections of SCRs. Triac and its applications, Uni-junction transistors, Triggering circuits and opto-couplers.

Unit II: Line commutated converters: (10 Hrs.)
Working of single pulse converter, two pulse mid point converter, three pulse midpoint converter and 3 phase six pulse bridge converter, effect of source inductance in converters, effect of tree wheeling diode.

Unit III: Single phase and three phase half controlled converters: (10 Hrs.)
Speed control of d.c. motors using line commutated converters. Cycloconverters (single phase).

Unit IV: Static controllable switches: (10 Hrs.)
Characteristic and working of MOSFET Gate turn off Thyristers and insulated gate bipolar transistor, protection of SCR gate circuit protection, over voltage and over current protection, snubber circuit design, converter circuit faults and their protection.

Unit V: D.C. Choppers: (10 Hrs.)

Unit VI: Single phase and three phase invertors: (10 Hrs.)

Text Books:

Reference Books:

BEEP310 POWER ELECTRONICS

LIST OF EXPERIMENTS: (30 Hrs)
1. To study and plot V-I characteristics of SCR
2. To study and plot V-I characteristics of TRIAC
3. To study and plot V-I characteristics of UJT
4. To study UJT as Relaxation Oscillator
5. To study and plot IGBT characteristics
6. To study and verify the operation of single phase cycloconverter and plot the waveforms
7. To study parallel inverter
8. To study Class A commutation of a Thyristor
9. To study and plot characteristics of DC chopper
10. To study and plot the characteristics of single-phase converter
11. To Plot the characteristics of 1-phase full wave converter in MATLAB Software.
12. To Plot the characteristics of 3-phase bridge inverter in PSim Software.
13. Open Ended experiments

BCSL202 COMPUTER ARCHITECTURE & ORGANIZATION (3-1-0-4) Total Hr.: [60 Hrs.]
Course Objectives:
1. To make the students acquainted with the organization and architecture issues of digital computers.
2. To understand the design and working of various organizational blocks.
3. To study in detail the operation of the arithmetic units, control units and the concept of pipelining.
4. To study the different ways of communicating with I/O devices and standard I/O interfaces.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand the basic structure and operation of a digital computer.
2. Understand different types of control and concept of pipelining and ways of communicating with I/O devices and interfaces.
3. Understand organization and design of memory. Concept, structure and operation of Cache memory and virtual memory.

Course Content:

Unit I: BASIC STRUCTURE OF COMPUTERS (6 Hrs.)
Functional Units, Basic operational concepts, Bus structures Addressing modes, subroutines; parameter passing, Instruction formats, expanding opcodes method.

Unit II: BASIC PROCESSING UNIT (10 Hrs.)
Bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Microprogrammed Control, microinstruction format, Bit slice concept.

Unit III: ARITHMETIC UNIT (12 Hrs.)
Number representations and their operations, Design of Fast Adders, Signed multiplication, Booth’s Algorithm, bit-pair recoding, Integer Division, Floating point numbers and operations, guard bits and rounding.

Unit IV: THE MEMORY SYSTEM (12 Hrs.)
Various technologies used in memory design, higher order memory design, multimodal memories and interleaving, Associative Memory, Cache memory, Virtual Memory

Unit V: INPUT/OUTPUT ORGANIZATION (10 Hrs.)
I/O mapped I/O and memory mapped I/O, interrupts and interrupts handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Direct Memory Access COMPUTER PERIPHERALS: I/O devices such as magnetic disk, magnetic tape, CDROM systems.

Unit VI: RISC Philosophy: (10 Hrs.)

Text Books:

Reference Books:

BECL301 DIGITAL SYSTEM DESIGN (3-1-2-5) Total Hr:[60 Hrs].
Course Prerequisite: Basic Electronics (BPHL105), Electronic Devices & Circuits (BECL201)
Course Co-requisite: Analog Systems And Design (BECL302)

Course Objectives:
1. To impart fundamentals of digital system design
2. To study system modeling using VHDL
3. To study CPLD and FPGA Architecture.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand digital systems modeling using VHDL.
2. Write correct synthesizable System VHDL models along with test benches.
3. Design digital systems that are reconfigurable for testing.
4. Simulate and synthesize programming models for digital circuits using ISE and Quartus tools.

Unit I: Introduction (12 Hrs.)
Introduction to VHDL, Methodologies, design Units, data objects, VHDL data types, Attributes.

Unit II: VHDL Statements and concept of delays (8 Hrs.)
Concurrent and sequential statements, inertial and transport delays, delta delay, signal drivers.
Unit III: Programming concepts. (8 Hrs.)
Subprograms – Functions, Procedures, generic, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.

Unit IV: Combinational System Design (12 Hrs.)
Combinational logic circuit design and VHDL implementation of following circuits – fast adder, Subtracter, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits.

Unit V: sequential System Design (10 Hrs.)
Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (Pseudorandom and CRC)

Unit VI: Introduction to PLDS (10 Hrs.)

Text Books:

Reference Books:

BECP301 DIGITAL SYSTEM DESIGN
LIST OF EXPERIMENTS (30 Hrs)
1. Write a VHDL code for different logic gates.
2. Design 4:1 multiplexer and write a VHDL code for same using data flow style of modeling.
3. Design 4-to-16 decoder by combining two 3-to-8 decoders and write a VHDL code for same using behavioral style of modeling.
4. Design BCD to & segment decoder and write a VHDL code for same using behavioral style of modeling.
5. Design of F/F and write a VHDL code for same using behavioral style of modeling.
6. Design half adder and full adder and write a VHDL code for same using dataflow style of modeling.
7. Design a 9-bit Parity generator circuit and write a VHDL code for the same using structural style of modeling.
8. Design a decade counter using J-K flip-flops .and write a VHDL code for the same using structural style of modeling.
9. Design three –bit up-down counter and write a VHDL code for the same using structural style of modeling.
10. Design of Finite state machine to detect a sequence “1011” using Mealy model .and write VHDL code for the same.
11. Implementation & Testing of Counter on Xilinx FPGA
12. Implementation & Testing of Clock circuits on Xilinx FPGA.
13. Design a 4 bit comparator
14. Design BCD to seven segment decoder.
15. Design Arithmetic and Logic Unit.

BECL205 FIELD THEORY (3-1-0-4)
Total Hr.:[ 60 Hrs.]

Course Prerequisite: Applied Mathematics-I (BAML101) Applied Mathematics-II (BAML102),
Applied Mathematics—III (BAML201), Basic Electronics (BPPL105), Basic Electrical (BEEL106)

Course Objectives:
1. To study electric and magnetic fields from stationary and dynamic charge and current distributions.
2. To study and understand properties of waves its propagation and waveguides.
3. To impart the knowledge of radiations, dipoles and potentials in Electromagnetic fields.
4. To inculcate the fundamentals of Antennas and its parameters

Course Outcomes:
At the end of the course the student shall be able to:
1. Apply vector calculus to understand the behavior of static electric fields and static magnetic fields in standard configurations
2. Understand the concept of Maxwell’s equation for static and time varying fields.
3. Workout simplified solutions to problems of electromagnetic wave propagations, waveguides and antennas

Course Content:

Unit I ELECTROSTATICS: (10 Hrs)
Introduction to Cartesian, cylindrical and spherical coordinate systems. Electric field intensity, flux density, Gauss’s law, divergence, divergence theorem, Electric potential and potential gradient.

Unit II MAGNETOSTATICS: (10 Hrs)
Current density and continuity equation, B-S law, Ampere’s circuit law and applications, Magnetic flux and Flux density, Scalar and Vector magnetic potentials.
Unit III Maxwell’s Equations and Boundary Conditions: (8Hrs)
Maxwell’s equations for steady fields. Maxwell’s equations for time varying fields. Electric and magnetic boundary conditions.

Unit IV Electromagnetic Waves: (12Hrs)
Electromagnetic wave equation, wave propagation in free space, in a perfect dielectric, and perfect conductor, skin effect, Poynting vector and Poynting theorem, reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle

Unit V Waveguides: (12Hrs)
Introduction, wave equation in Cartesian coordinates, Rectangular waveguide, TE, TM, TEM waves in rectangular guides, wave impedance, losses in wave guide, introduction to circular waveguide.

Unit VI Radiation: (8Hrs)
Retarded potential, Electric and magnetic fields due to oscillating dipole (alternating current element), power radiated and radiation resistance, application to short monopole and dipole. Antenna Efficiency, Beamwidth, Radiation Intensity, Directive Gain Power Gain & Front To Back Ratio. Advance topics on the subject

Text Books:

Reference Books:

BECL302 ANALOG SYSTEMS AND DESIGN (3-1-2-5) Total Hr.[60 Hrs.]

Course Objectives:
1. To understand analog circuits and systems.
2. To know linear and nonlinear applications of operational amplifier ICs.
3. To study frequency response of different circuits based on operational amplifier applications.
4. To study and use different ICs such as timers for applications.

Course Outcomes:

At the end of the course the student shall be able to:
1. Apply OPAMP fundamentals in design, evaluation and analysis of analog applications.
2. Design filters, oscillators and analog systems.
3. Develop and design analog system for linear and non linear operations.

Course Content:

Unit I: Operational Amplifier Fundamentals (12hrs)
Operational Amplifier, Basic Op-Amp Configuration, an Op-Amp with Negative Feedback, Voltage Series and Voltage Shunt Configurations, Difference amplifiers, Instrumentation Amplifier, Specification of an Op-Amp, Offset Voltages and Currents, CMRR, Slew Rate

Unit II: General Linear Applications (9Hrs)
Constant Current Source and Voltage Source, Summing, Scaling and Averaging Amplifiers, Voltage To Current Converter with Floating And Grounded Load, Current To Voltage Converter, Integrator and Differentiator

Unit III: Structure of Op-Amp (9Hrs)
Differential Amplifier, Cascaded Differential Amplifier Stages and Level Translator, AC and DC Analysis of Cascade Amplifier, Design of two stage direct-coupled amplifier.

Unit IV: Active Filters and Oscillators (10 Hrs)
Classification of Filters , Active Filters, First to Sixth – Order Butterworth filter , Multiple–Feedback Filters (Band Pass And Band Reject Filters) IGMF configuration, All Pass Filter, Cascade Design Of Filters Classification of Oscillators, Design of Op-amp based Phase Shift And Wein Bridge Oscillators, Square, Triangular And Saw Tooth Wave Generators

Unit V: Non-Linear Circuits (10 hrs)
Schmitt Trigger, Voltage Comparator, Voltage Limiters And Window Detector, Clips And Clamps, Peak Detector, Precision Rectifiers, Analog Switches

Unit VI: Special ICs Applications (10 hrs)
The 555 Timer, Phase Locked Loops IC565, ICL8038 & XR2206 Function Generator, Voltage Controlled Oscillator Basic Operation, IC based Voltage Regulator Circuits, Dual Track Voltage Regulator, Three - Terminal Regulator(Fixed Regulator) Voltage Adjustment And
Current Boosting Of Fixed Regulator, Merits And Drawbacks Of Linear Regulators, Advance topics on the subject

Text Books:

Reference Books:

BECP302 ANALOG SYSTEMS AND DESIGN
LIST OF EXPERIMENTS (30Hrs)
1. Design and simulate buffer amplifier using IC 741.
2. Design and verify gain and frequency response of Inverting and Non-inverting amplifier using IC 741. Show its simulation results on microcap.
4. Verify Op-amp parameters (1) CMRR (2) Slew Rate.
5. Verify and simulate Clipper circuit using IC 741.
6. Design and verify Multivibrator circuits using IC 555.
7. Design any regulator IC application on breadboard.
8. A) To design a Zener Shunt Voltage Regulator.
B) Simulate the Zener Shunt Voltage Regulator and observe the waveform using microcap.
9. A) To design a Wein Bridge Oscillator.
B) Generate the oscillations in microcap using Wein Bridge oscillator.
10. A) To design 2nd order Low Pass Filter.
B) To study the frequency vs gain characteristic of Low Pass Filter using Microcap.
11. A) Study of Low Voltage Regulator using IC 723.
B) Simulate and observe the regulated waveform on microcap.
12. A) To design a Emitter Follower type of Voltage Regulator.
B) Simulate the Emitter Follower type of Voltage Regulator and observe the waveform using microcap.
13. To design RC-phase shift oscillator and simulate using microcap.
14. Verify and simulate positive and negative clamper.
15. Design and verify VCO circuit using 555

BECP206 MODELING & SIMULATION (0-0-2-1)
Course-Prerequisite : Basic Electronics (BPHL105), Digital System Design (BECP301), Analog Systems And Design (BECL302)

Course Objectives:
1. To select and apply appropriate simulation tools and techniques.
2. To study the modeling of systems using various tools.
3. To obtain and study the results of models designed on advanced simulation tools.

Course Outcomes:
At the end of the course the student shall be:
1. Design and Simulate the linear and non-linear based analog and digital circuits for engineering applications.
2. Apply different simulation tools for desired simulation results and apply visualization techniques to support the simulation process.

LIST OF EXPERIMENTS (30Hrs)
1. Introduction of T Spice & Tanner tool
2. Design current mirror using tanner tool,
3. Design sample and hold circuit using tanner.
6. Design Three MOSFET voltage divider using tanner
7. Design common source amplifier using tanner.
11. Design of Signal processing blockset using MATLAB.
12. Design of multi-order system using MATLAB and plot its time domain & Frequency domain response.
13. Open Ended modeling experiments.

MBL103: GENERAL PROFICIENCY-III: Hobby classes
For syllabus : please refer electronics engg. Department syllabus fourth semester.

FIFTH SEMESTER
BECL303 MICROPROCESSOR BASED SYSTEMS [3-1-2-5] Total Hr.:[60 Hrs.]
Course-Prerequisite : Basic Electronics (BPHL105), Digital System Design (BECP301), Data Structures Using
C(BCSL201), Computer Architecture & Organization (BCSL202)

Course Objectives:
1. To study concepts of microprocessors family
2. To study interfacing of microprocessors with peripheral devices.
3. To understand the design of microprocessor based systems.

Course Outcomes:
At the end of the course the student shall be:
1. Understand the architecture and programming of processor family.
2. Understand hardware and software aspects of microprocessor based systems
3. Interface peripheral devices with microprocessors.

Course Content:
Unit I: (12 Hrs)
Building Concepts of Microprocessor, Introduction to 16, 32, 64 bit Microprocessor, Comparison of 8086 / 8088 CPU Architecture, Microprocessor Evolution - INTEL 8086 to Pentium with focus on Clock Speed, Concurrent operation of EU and BIU, Memory Organization, Interfacing addressing modes, Instruction set, Programming examples, Pseudo Opcodes, Assembler Directives.

Unit II: (10 Hrs)
Introduction to Software and Hardware tools. [Cross assemblers, Logic analysers, Emulators, Simulators], Architecture, Interfacing and programming of Peripheral 8255, Interfacing of ADC, DAC & Traffic controller, Stepper Motor.

Unit III: (08Hrs)
Architecture, Interfacing and programming of Peripherals, 8259 & 8251, Serial Communication Standards RS 232, RS 485,

Unit IV: (10 Hrs)
Architecture, Interfacing and programming 8253-PIT, 8279 – Keyboard Display Mode, Sensor matrix Mode, 8237 DMA Controllers and Organization, Control Words.

Unit V: (10 Hrs)
8086 / 88 Maximum Mode, Architecture and Programming of 8087 and its Interfacing with 8086/8088

Unit VI: (10 Hrs)
80386 Architecture, Real and Protected Mode, Register Model, Memory Management Unit, Latest trends in microprocessors systems.

Text Books:

Reference Books:

BECP303 MICROPROCESSOR BASED SYSTEMS [30Hrs]

LIST OF EXPERIMENTS:
1. Study of 8086 microprocessor, Assembler/Cross Assembler/Simulator and basic programs like addition of two 16 bit, 32 bit numbers and series addition [complete architecture, segmentation and pin diagram].
2. Write an ALP to compare a string by using string related instructions of 8086.
3. Write an assembly language program for 8086 to generate Fibonacci series and store it from memory location 0050H.
4. Write an ALP to find the Number in Memory Array.
5. Write an ALP to arrange a string in Ascending/Descending order.
6. Interface 8255 with 8086 microprocessor and write a program to glow the alternate LED’s.
7. Interface 8253 with 8086 microprocessor
8. Interface 8251 with 8086 microprocessor
9. Interface peripheral device Analog to Digital Converter ADC with 8086 using 8255
10. Open ended experiment.

BECL 304 SIGNAL & SYSTEMS [3-1-0-4] Total Hr.:[ 60 Hrs.]

Course Prerequisite: Applied Mathematics – III (BAML201), Network Theory(BEEL201), Communication Electronics:(BECL 202)
Course Co requisite: Television Engineering (BECL 401)

Course Objectives:
1. To introduce the fundamental characteristics, concept and technique of signal and systems.
2. To familiarize with time and frequency domain representation of linear systems and understanding the inter-relationship between two domains.
3. To study development of mathematical skills like Fourier series, Transforms, Random Theory are analyze using signal & System with transform techniques.
4. To familiarize with techniques suitable for analyzing and synthesizing both continuous-time and discrete time systems.

Course Outcomes:
At the end of the course the student shall be able to:
1. Obtain a system response to standard signals and then to any signals.
2. Represent the systems in time and frequency domain using Fourier transforms
3. Understand and analyze discrete time signals for information measures.

Course Content:

Unit I: PROBABILITY (10 Hrs)
Random process, probability, random variables, processes stationary, mean correlation covariance functions, time average and ergodicity, transmission of random process through a linear filter, spectral density, Guassian process noise, narrow band noise, envelope of sine wave plus narrow band noise.

Unit II: LINEAR TIME-IN Variant SYSTEM (12 Hrs)
Different Types Of Signals; Linearity, Time Invariance And Causality; Impulse Sequence, Impulse Functions And Other Singularity Functions Time-Domain Representation And Analysis Of LTI Systems Based On Convolution And Differential Equations, Convolution Sum, Convolution Integral And Their Evaluation, Properties Of LTI Systems.

Unit III: CONTINUOUS TIME FOURIER TRANSFORM [CTFT] (10 Hrs)
Representation Of Aperiodic Signal, Fourier Transform For Periodic Signals, Properties Of CTFT, Properties Of CTFT, Convolution Property

Unit IV: DISCRETE TIME FOURIER TRANSFORM [DTFT] (10 Hrs)
Representation Of Aperiodic Signal, Fourier Transform For Periodic Signals, Properties Of CTFT, Properties Of CTFT, Convolution Property

Unit V: SAMPLING (08 Hrs)

Unit VI: INFORMATION THEORY (10 Hrs)
Information measures, Entropy, Chaney capacity of discrete & continuous channels,Shannon Hartley Theorem Huffman Coding[upto 3rd Order], Advancement in signals and systems.

Text Books:

Reference Books:
1. B.P.Lathi, Signals & systems, Berkeley Cambridge Pr, 1987

BECL 401 TELEVISION ENGINEERING [3-1-2-5] Total Hr.:[60 Hrs.]

Course-Prerequisite: Communication Electronics (BECL 202)
Course-Co requisite: Signal & Systems (BECL 304)

Course Objectives:
1. To introduce the study and analyze of transmission & reception for audio and video systems.
2. To study the principle of monochrome and color TV.
3. To study the principle of CCTV, MATV, CATV, HDTV.
4. To study the principle of LED TV and LCD TV.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand the fundamental concepts of television transmitter and receiver systems.
2. Understand different color transmission and reception systems used worldwide and its compatibility
3. Trouble-shoot, test & Align television systems.

Course Content:

Unit I: (12 Hrs)
Brief Introduction to TV transmission and reception, Interlaced scanning, TV picture: resolution, brightness, Video Bandwidth, Line and frame wave frequency, blanking synchronizing ad equalizing pulses, complete composite video signal, VSB transmission and Reception.

Unit II: (10 Hrs)
Monochrome TV camera tubes: image Orthicon, Vidicon and Plumbicon tubes, Monochrome TV transmitter block diagram, and TV transmitting and receiving antenna.

Unit III: (10 Hrs)
Monochrome TV Receiver block diagram, Balun, RF tuner, Video IF amplifier, Video detector, Intercarrier sound system, Sound take off circuit, Sound IF and FM detector, Transistorized Keyed AGC circuit, Horizontal and Vertical deflection circuits, EHT generator.

Unit IV: (10 Hrs)

Unit V: (10 Hrs)
Color signal transmission and reception, frequency interleaving, modulation of color – difference signals. PAL color TV system, choice of sub – carrier frequency, PAL color receiver, comparison of PAL with NTSCa and SECAM system.

Unit VI: (08 Hrs)
Satellite TV technology- Cable TV ,digital television – Transmission and reception, projection Television – Flat panel display TV receiver, Stereo sound in TV ,3D TV, HDTV ,Digital equipments for TV studios. Introduction to Plasma, LED TV

Text Books:

Reference Books:

BECP 401: TV ENGINEERING
Total Hrs.: 20

LIST OF EXPERIMENTS :

1. Introduction to Monochrome Picture tube.
2. To demonstrate RF Tuner Section and perform analysis of faults in the tuner section
3. Testing of Sound IF section and perform analysis of faults in the audio section
4. Testing of Video IF Section and perform analysis of faults in the Video section
5. To demonstrate circuit description of Sync & Horizontal oscillator section and perform analysis of faults in color & Monochrome TV.
6. To demonstrate circuit description of Vertical oscillator section and perform analysis of faults in color & Monochrome TV.
7. To demonstrate circuit description of Video and Chroma section and perform analysis of faults.
8. To demonstrate circuit description of system control section & perform analysis of faults in color & Monochrome TV.
9. Testing of various types of antenna and their radiation pattern.
10. To demonstrate an Audio & Video signals over satellite link.
11. To change different combinations of uplink & downlink frequencies and check the communication link
12. To transmit & receive function generator waveforms through satellite link
13. To study LCD Television
14. To study the block diagram of HDTV Receiver.
15. To observe voltages and waveforms of different test points and fault switches in HDTV Receiver.

BECL 403 DIGITAL COMMUNICATION [ 3-1-2-5] Total Hr.:[60 Hrs.]

Course-Prerequisite :Communication Electronics (BECL 202), Applied Mathematics – III (BAML201)
Course-Co requisite: Signal & Systems (BECL 304), Television Engineering (BECL 401)

Course Objectives :
1. To understand the basic knowledge of digital communication system.
2. To study the issues such as coding, multiple access, error probability, algorithms etc for analog and digital communication.
3. To impart the knowledge of design, analysis & comparison of digital communication systems.

Course Outcomes :
At the end of the course the student shall be able to:

6. Apply knowledge of mathematics, science and engineering in the design of digital communication circuits and systems.
7. Analyze the different coding technique for design and modeling of digital communication
8. Design digital communication systems to meet predefined specifications.
9. Design and conduct experiments for testing digital communication circuits and systems.

Course Content:

Unit I (12Hrs)
Digital base band modulation techniques :Bandwidth of digital Data, Base band system, Formatting textual Data, Messages, characters, and symbols, Formatting Analog Information, Sources of Corruption, Uniform and non uniform quantization, Base band Modulation, Correlative Coding, Formatting analogue information.

Unit II (10Hrs)

Unit III: (10Hrs)
Baseband Modulation and demodulation techniques: Digital Band pass Modulation techniques, Detection of signals in Gaussian noise, Coherent detection, Non coherent detection, Complex envelop, Error performance for Binary system, M-ary signaling and performance, Symbol error performance for M-ary Systems, Bit error Rate calculations.

Unit IV (10Hrs)
Advanced modulation method Gram – Schmitt procedure, signal space representation of modulated signals nonlinear modulation methods with memory error probability and optimum receivers for AWGN channels. The signal space concept

Unit V: (10Hrs)
Block and convolutional channel codes Linear block codes, generator matrix and parity check matrix, some specific linear block codes, cyclic codes, transfer function of a convolution code, optimum decoding of convolutional codes- Viterbi algorithm distance properties of binary convolutional codes

Unit VI (8Hrs)
Spread Spectrum techniques: Spread Spectrum Overview, Pseudo noise Sequences, Direct-Sequence Spread Spectrum systems, Frequency hopping systems, Synchronization, Jamming consideration, Orthogonality between codes Multiple access techniques Commercial Applications, Cellular Systems. Advance topics on Digital Communication

Text Books:

Reference Books:

BEC 403 DIGITAL COMMUNICATION
LIST OF EXPERIMENTS:
1. To Study and observe the performance of Return to Zero (RZ) types of line codes
2. To Study and observe the performance of Non-Return to Zero (NRZ) types of line codes
3. To perform TDM-PCM Transmission and Reception
4. To Study and perform Error Detection and Correction codes.
5. To understand the concept of Delta Modulation and to achieve the Delta Modulation/De-Modulation
6. To study the performance of adaptive Delta modulator/De-modulator circuits.
7. To Study and observe the performance of Digital carrier system—ASK.
8. To Study and observe the performance of Digital carrier system—FSK.
9. To Study and observe the performance of Digital carrier system—PSK
10. To Study and observe the effect of signal Distortion using EYE-Diagram.
11. MATLAB Simulation of various communication techniques.

BITLE302 COMPUTER NETWORKS [4-0-0-4]
Total hr. 60 Hrs.
Course Prerequisite: Computer Architecture & Organization (BCSL 202)

Course Objectives:
1. To understand the computer network architectures.
2. To make aware of design and performance perspective of network architectures.
3. To discuss current trends in communication networks.

Course Outcomes: student shall be able to:
4. Analyze and implement computer network algorithms.

Course Content:

Unit-I: (12 Hrs)
Introduction: The use of computer networks, networks for companies, network for people, social issues. Network hardware. LAN’s, Man’s, WAN’s, wireless networks, internet works, network software, protocol hierarchies, design issues for layers, interfaces and services, connectionless oriented and connectionless services, service primitives, relationship of services to protocols, the OSI reference model, TCP/IP reference model, comparison of OSI and TCP/IP reference model, critique of OSI model & protocols, critique of TCP/IP reference model. Example networks - novel! Netware, RPANET, NSFNET, the internet, SMDS, X.25 network,
frame relay, network standardization - who’s who in the telecommunication world, who’s who in international standards world, who’s who in the internet standards world.

Unit-II:  
Physical Layer - The theoretical basis for data communication-Fourier analysis, bandwidth-limited signals, maximum data rate of a channel, transmission media-magnetic media, twisted pair coaxial cable, fiber optics. Wireless transmission, microwave transmission, infrared and millimeter waves, light wave transmission. Telephone system structure, politics of telephones, local loop, trunks and multiplexing, switching, narrowband ISDN - services, architecture, interface, perspective on N-ISDN, broadband ISDN & ATM-virtual circuits versus circuit switching, transmission in ATM networks, ATM switches.

Unit-III:  
Data Link Layer - design issues - services provided to the network Layer, framing, error control, flow control, error correcting & detecting codes, elementary data link protocols, simplex stop and wait simplex protocol for noisy channel, sliding window protocols-one bit protocol, go back protocol, selective repeat protocol. The medium access sub layer - static and dynamic channel allocation in LANs and MANs, Multiple access protocols - ALOHA. CS\textbackslash JA, collision free protocols, limited contention protocols, wavelength division multiple access protocols, wireless LAN protocols, IEEE Standards 802 for LAN and MANs-802.3 & Ethernet, token bus. token ring, comparison 802.6, 802.2.

Unit-IV:  
The Network Layer - Design issues, services provided to the transport layer, internal organization, comparison of virtual circuit and datagram subnets, routing algorithms. Optimality principle, shortest path routing, flooding, flow-based routing, distance vector routing, link state routing, hierarchical routing, broadcast & multicast routing, congestion control algorithms, general principles prevention policies, traffic shaping, flow specifications, congestion control in virtual circuit subnets. choke packets, load shedding, jitter control, congestion control for multicasting. Internetworking - how networks differ, concatenated Virtual circuits, connectionless Internetworking tunneling, internet work routing, fragmentation, firewalls, the Network layer in the internet - IP protocol, IP address. subnets, internet control protocols, OSPF. BGP, internet, Multicasting.

Unit V:  
Transport and Application Layer - services provided to the upper layer, Quality of Service, transport service primitives, elements of transport protocols, addressing, establishing a connection, releasing a connection, flow control & buffering, multiplexing, crash recovery, network security - traditional cryptography, fundamental principles, secret-key algorithms, public key algorithms, authentication protocols, digital signatures, social issues.

Unit VI:  
Recent trends and advance topics.

Text Books:

Reference Books:

BECP 305: ELECTRONICS WORKSHOP
PRACTICE-I [ 0-0-2-1]

Course Objectives:
1. To use & analyze and identify the different types of Integrated Circuits
2. To understand the identification and computer aided design of PCB layout using different software tools.
3. To enable firsthand experience of components, their purchase, assembly, testing and trouble shooting.
4. To perform single sided and double sided PCB design using TFT machine by using a various method (Etching, Drilling, Mounting and Soldering of Components).
5. To do Mini Projects using Analog and Digital IC’s, active and passive components for Linear and Non-linear electronics circuits by organizing and managing time and resources effectively.
6. To familiarize students with modern engineering software tools and equipment to analyze Electronics and Telecommunication engineering problems

Course Outcomes:
At the end of the course the student shall be able to:
1. Identify and test the electronic components used in systems.
2. Implement, design and test PCB manually and using CAD tool

LIST OF EXPERIMENTS :

Page 90 of 323
1. To identify electronics and Surface Mounting Devices (SMD) components.
2. To perform Component testing using Measuring Instruments.
3. To perform testing of electronics components using CRO, Multi-meter, & LCR-Q-meter.
4. To identify different type of Transformers, Switches, Relays, Cables, & Connectors.
5. To design Printed Circuit Board (PCB) Layout & preparation of PCB artwork using graph & OrCAD Software.
6. To perform PCB Exposing & Etching by various methods.
7. To perform soldering and de-soldering on dot printed circuit board.
8. To study 8051 Microcontroller & downloading program using Power lab.
9. Mini Project
10. To design Printed Circuit Board using wave Soldering (single wave) Machine.

BECP311- SELF STUDY [0-0-2-2]

Course Objectives:
1. To use advanced communication tools for analysis and modeling the communication based techniques
2. To introduce the advanced topics based on Electronics Engineering and Electronics and Telecommunications Engineering.

Course Outcomes:
At the end of the course the student shall be able to:
1. Use various software simulation tools for design and modeling the electronics circuit based on Advanced engineering.
2. Analyze recent trend and advanced topics in electronics & Telecommunication Engineering to meet predefined specifications

MBL104: General Proficiency-IV
(Advanced Communication Skill)

SEMESTER-V [2L]
For syllabus : please refer electronics engg. Departments syllabus in fifth semester

SIXTH SEMESTER
BECL 315 TELEMATICS [3-0-2-4]
Total Hr.:[ 45 Hrs.]

Course-Prerequisite :Communication Electronics (BECL 202), Signal & Systems (BECL 304), Television Engineering(BECL 401), Digital Communication (BECL 403)

Course Objectives :
1. To identify the difference setting of Telephone receiver.
2. To describe the operation of cordless telephone.
3. To study the different Digital Switching system.
4. To study Principal and Service Provided by ISDN.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand concepts of wired and wireless communication systems.
2. Apply and analyze the principles of GPS,GSM,EPABX etc. technologies to applications.
3. Use various types of Switching System & to learn switching standard.
4. Understand working principle of switching mechanism of Relay & DTMF receiver.

Course Content:

Unit I: INTRODUCTION (08 Hrs)
Telephone Hardware And Telephone Line, Elements Of Switching Systems, Folded, Non-Folded, Non-Blocking, Blocking & Other Types Of Network Configurations, Two Wire And Four Wire Systems And Conversions, Echoes And Equalization, Signaling. Direct Control, Step By Step Switching & Other Switching, Rotary Dial Mechanism, Crossbar Control System, CCITT Standards Signaling, Pulse & Tone Dialing [DTMF], Choice Of Tone Frequency And Associated Problems.

Unit II: ELECTRONIC SWITCHING (07 Hrs)
Time Multiplexed Time Switch, Time Multiplex Space Switch, Time Division Space Switch, Time Slot Interchanging; Dual Processor Configuration, Reliability and Availability Criteria.

Unit III: TRAFFIC ENGINEERING (06 Hrs)
Overview of TRAFFIC Engineering, Numbering Plan and Charging Plan.

Unit IV: COMPUTER COMMUNICATION (08 Hrs)
Computer Communication Over Telephone Line, Low, Medium and High Speed MODEM with Standard Bit Rates.

Unit V: ISDN AND BISDN (08 Hrs)
Overview, ISDN Channels, User Access, ISDN Protocol, EPBAX Systems, DTMF, GSM, CDMA.

Unit VI: ASYNCHRSONOUS TRANSFER MODE (08 Hrs)
Protocol Architecture, ATM Logic Connections & Cells, Transmission of ATM Cells, ATM Adoption Layer, Traffic Control ATM in ISDN.

Text Books:
Reference Books:

BECP 315
TELEMATICS
Total Hrs. 20

LIST OF EXPERIMENTS: Minimum 10 Practical from list given below
1. To Execute the AT commands using GSM Trainer Kit
2. To Track & Analyze the PRN Code of satellite using complete GPS Environment
3. Analyze & Plot the Tx/Rx IQ signals of GMSK Modulation using Mobile Trainer Kit
4. Analyze & Plot the Signal Constellation of GMSK Signal Using Mobile Trainer Kit.
5. To Analyze the Vibrator in GSM handset Using Mobile Trainer Kit
6. To Measure the PWM signal of the Vibrator in GSM handset Using Mobile Trainer Kit
7. To Measure the PWM signal of the Buzzer in GSM handset Using Mobile Trainer Kit
8. Analyze the Audio Signal using Cobba IC
9. To Analyze and detect Switched Fault insertion using Mobile Trainer Kit.
10. To Analyze the working of Voltage dropper and key matrix section using DTMF Telephone Trainer Kit
11. To Analyze and Measure the ring Detection phenomena using EPABX Trainer System
12. Introduction to EPABX unit and To analyze & measure the Trunk Relay Switching.
13. To Analyze of the working of Dialer Section & of DTMF Signals using High Pass Filter and Low Pass Filter
14. To Analyze the working of CSMA/CD (Carrier Sense Multiple Access with Collision Detection)
15. To analyze buzzer & charging phenomenon in GSM handset

BECL 405: DIGITAL SIGNAL PROCESSING

Course-Prerequisite: Signal & Systems (BECL 304), Communication Electronics (BECL202), Applied Mathematics –III (BAML201)

Course-Co requisite: Control System Engineering (BEEL312)

Course Objectives:
5. To study signals for different kinds of applications in general and infer information from deterministic and random signals.
6. To understand the implementation and design digital filters.
7. To analyze signals using the discrete Fourier transform.
8. To understand circular convolution, its relationship to linear convolution.

Course Outcomes:
4. Apply theoretical and practical approach of modern signal processing in digital environment
5. Apply appropriate technique for application areas with particular stress on speech and image data
6. Apply the techniques, skills, and modern engineering tools such as MATLAB

Course Content:
Unit I: (07 Hrs) Discrete time signals and systems, classification of discrete time systems and its properties, Linear convolution, Cross Correlation, Autocorrelation of discrete signals, sampling theorem & sampling process.

Unit II: (08 Hrs) Frequency domain representation of discrete time signals and systems, Fourier transform of discrete time signals, properties of discrete time, Fourier transform. The Z-transform, Definition, properties of ROC for the Z-transform, Properties of Z-transform, Inverse Z-transform using contour integration, complex convolution theorem, Unilateral Z–transform.

Unit III: (08 Hrs) Transform analysis of LTI system & structure for discrete – time system. Frequency response of LTI system, Relationship between magnitude & phase response, Block diagram representation & signal flow graph representation of IIR and FIR systems. Linear constant coefficient difference equations, Basic structures for IIR systems, transposed forms, basic network structures for FIR systems, lattice structures.

Unit IV: (07 Hrs) Filter design Techniques: Design of discrete time IIR filters from continuous time filters, Frequency transformation of low pass IIR filters, Design of FIR filters by windowing, FIR filter design by Kaiser and Hamming window method.

Unit V: (08 Hrs) Discrete Fourier Transform: Discrete Fourier series, properties of discrete fourier series, Discrete fourier

**Unit VI:** (07 Hrs)

**Text Books:**

**Reference Books:**

**BECP 405: DIGITAL SIGNAL PROCESSING**
**Total Hrs: 20**

**LIST OF EXPERIMENTS:**

1. Study of basic discrete time signals such as Unit impulse, step, ramp, real and complex exponential and its representations using MATLAB functions.
2. Use of MATLAB functions to obtain linear convolution of discrete signals.
3. Write a program for computing cross-correlation and auto-correlation of the given sequences.
4. Write a program to test stability of given discrete-time system.
5. Write a program to find frequency response of given system.
6. Write a program to find DFT and FFT of given sequences.
7. Write a program to find circular convolution of given sequences.
8. Digital IIR filter design using MATLAB functions.
11. Study of DSP Processor using TMS 5416 and TMS 6713 starter kits.
13. Open ended experiment.

**BHUL301: ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT [3-0-0-3]**
**Total Hr.:[45 Hrs.**

**Course-Prerequisite:** General Proficiency-I (MBL101), General Proficiency-II (MBL102), General Proficiency-III(MBL103),General Proficiency-IV(MBL104)

**Course Objectives:**
5. To deal with the concepts of economics and management with and engineering perspective
6. To produce graduates with the ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.
7. To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modern society.
8. To cultivate the practices of independent learning on the part of the students that will prepare them to function effectively for diverse careers and lifelong learning.
9. To enable students to understand their role as engineers and their impact to society at the national and global context.

**Course Outcomes:**
At the end of the course the student shall be able to:

1. Understand the interaction between engineering, business management, technological environmental spheres in modern society
2. Practice basic principles of managerial economics, accounting and financial management technique for effective business decision making

**Course Content:**

**Unit I:** [7 Hrs]
Demand Utility and indifference curves, Approach to Analysis of demand, elasticity of demand, Measure of demand elasticity, Factors of Production, Advertising elasticity, Marginalism.

**Unit II** [8 Hrs]
Laws of Return and costs, price and output determination under perfect competition, monopoly, monopolistic competition, oligopoly, Depreciation and methods for its determination.

**Unit III** [7 Hrs]
Functions of central and commercial banks Inflation, Deflation, Stagflation, Direct and Indirect Taxes, Monetary and cycles, New economic policy, Liberalization, Globalization, Privatization, Market friendly state. Fiscal policy of the government, Meaning and phases of business.
Unit IV [8 Hrs]
Definition, Nature and scope of management, Functions of management- Planning, organizing, Directing, Controlling, Communicating

Unit V [7 Hrs]
Meaning of marketing management, Concept of marketing, Marketing Mix, Administrative and cost plus pricing, Channel of distribution, Advertising and sales promotion.

Unit VI [8 Hrs]

Text Books:
1. K.K.Dewett, Modern economics theory, S Chand & Co, 2006
2. Dr D. M. Mithani, Managerial Economics: Theory & Applications, Himalaya publication, 2008

Reference Books:

BEEL312 CONTROL SYSTEM ENGINEERING (3-0-0-3) Total Hr.:[45 Hrs.]

Course-Prerequisite: Signal & Systems (BECL 304), APPLIED MATHEMATICS – III (BAML201)
Course-Co requisite: Digital Signal Processing (BECL 405)

COURSE OBJECTIVES:
1. To impart the knowledge of fundamental concepts of control systems and mathematical modeling of the system,
2. To understand the concept of time response and frequency response of the system and to use for stability analysis of the system
3. To study and design compensators and controllers for control systems.
4. To model systems and signal flow graph and evaluate the properties of the overall systems.

Course Outcomes:
At the end of the course the student shall be able to:
1. Develop the mathematical models from a given physical system and study it for obtaining time response and frequency response.
2. Learn the stability of a physical system using graphical tools such as Bode plots, Nyquist plot, Root locus etc.
3. Perform experiment on real-time systems with an objective of studying its performance, stability, controllability and observability.

Course Content:
Unit I: Mathematical modeling and control system components. (10 Hrs.)
Introduction to need for automation and automatic control, use of feedback, broad spectrum of system application, Mathematical modeling, (Electrical & Electromechanical) diff. Equations., transfer functions, block diagram, signal flow graphs, application to elementary systems, simplifications, effect of feedback on parameter variations, disturbance servomechanism and regulators, Control system components, electrical electromechanical, their functional analysis and input/output representation.

Unit II: Time response analysis (08 Hrs.)
Time response of system, first order and second order system, standard inputs, concept of gain and time constants, Steady state error, type of control system, approximate methods for higher order system.

Unit III: Stability of control systems. (05 Hrs.)
Stability of control systems, conditions of stability, characteristics equations, Routh-Hurwitz criterion, special cases for determining relative stability.

Unit IV: Root locus analysis (08 Hrs.)
Root location and its effect on time response, elementary idea of root locus, effect of addition of pole and zero on proximity of imaginary axis.

Unit V: Frequency response analysis (8 Hrs.)
Frequency response method of analyzing linear system, Nyquist and Bode Plots, Stability and accuracy analysis from frequency response, open loop and close loop frequency response, Nyquist Criterion, Effect of variation of gain and addition of pole and zero on response plot, stability margin in frequency response.

Unit VI: State variable techniques (06 Hrs.)
State variable method of analysis, characteristics of system state, choice of state variables, representation of vector matrix differential equation, standard form, relation between transfer function and state variables. Advance topics on the control system.

Text Books:

Reference Books:
ELECTIVE- I

BCSL312 COMPUTER GRAPHICS & VISUALIZATION
(3-0-0-3) Total Hr.:[45 Hrs]

Course-Prerequisite : Applied Mathematics – III (BAML201), Computer Architecture & Organization (BCSL 202)

Course Objective:
5. To impart basic fundamentals of computer graphics
6. To aim at developing fundamental data structures and algorithm for modeling.
7. To provide carrier opportunities in developing Video Games, Virtual Reality Applications, Computer Simulations, Computer Aided Design and web design.
8. To impart the skills necessary for the generation of polygons and implementation of various polygon filling algorithms.

Course outcomes:
At the end of the course the student shall be able to:
4. Understand basics of 2 D and 3 D computer graphics and pixel classification.
5. Understand concept of animation and visual effects with reference to workflow and technology.
6. Understand algorithms and theories that form the basis of computer graphics and visualization.

Course Content:
Unit-I: (8 Hrs)
Introduction to Computer Graphics and Image Processing, Basic fundamentals of random scan, raster scan devices, Stereoscopic and Virtual Reality Systems, line and circle drawing algorithms

Unit-II: (8 Hrs)
Polygon filling methods- seed fill, fence fill, edge flag algorithm, scan conversion techniques, aliasing and normalizing techniques, clipping algorithms

Unit-III: (8 Hrs)
Basic 2D transformation, composite transformations- translation, rotation, scaling, reflection, shear views, windowing, Introduction to 3D transformation

Unit-IV: (8 Hrs)
Three dimensional display methods, parallel, perspective projections and types, hidden line and surface elimination techniques, shading and rendering

Unit-V: (5 Hrs)
Curve Generation: Cubic Spine, Braziers, B-Spline, blending of curves and other interpolation techniques, Introduction to Visualization, Applications, Visualization Techniques- parallel coordinates – a, charts (pie chart, bar chart, histogram, function graph, scatter plot, etc., graphs (tree diagram, network diagram, flowchart, existential graph, etc.) Venn diagram Euler diagram etc.

Unit-VI: (8 Hrs)
Recent trends in Computer Graphics and Visualization, Advanced topics & its Application.

Text Books:

Reference Books:

BECL 427 COMMUNICATION PROTOCOL DESIGN [3-0-0-3] Total Hr.:[45 Hrs.]

Course-Prerequisite: Digital Communication (BECL 403)

Course Objective:
1. To study about Protocols and Services.
2. To study about Security Methods.
3. To be Able to assign IP address to computer
4. To be Able to identify the network problems

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand network topology.
2. Understand architectures of network security and principle of Public Key Cryptography.
3. Analyze and solve the network problems.

Course Content:
Unit I: (8 Hrs)

Unit II: (8 Hrs)

Unit III: (8 Hrs)
Basic Protocol Mechanisms: Sequence control and error control, Flow control, Indication of change of peer state, change of service mode, Multiplexing and splitting, segmentation and reassembly, Prioritism.

Unit IV: (8 Hrs)
Multi-peer Consensus: Reliable broadcast, Election, commitment, Byzantine Agreement, Clock synchronization, finding a global state.

Unit V: (7 Hrs)
General principles of naming and routing, addressing structures, routing, congestion. Protocol encoding: simple binary encoding, TLV encoding, ASN.1 encoding, ASCII encoding,

Unit VI: (6 Hrs)
Protocols in the OSI lower layers, Applications support protocols, Applications Protocols: FTP, Distributed transaction processing, message handling, hypertext and WWW, web services, Latest development in protocol design.

Text Books:

Reference Books:
1. König, Hartmut, Protocol Engineering, Springer

BECL 406 CMOS VLSI DESIGN [3-0-0-3] Total Hr.: [45 Hrs.]

Course-Prerequisite: Basic Electronics (BECL105), Electronic Devices & Circuits (BECL 201), Modeling & Simulation(BECP 206)

Course Objectives:
5. To study fundamental concepts in VLSI systems design.
6. To understand computer-aided techniques used in the design verification of VLSI systems using CMOS technology
7. To study evaluation procedure and the performance parameters of CMOS designs
8. To learn different processing technologies used for VLSI design.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand knowledge required to design, implement and test VLSI circuits through CMOS technology.
2. Integrate the VLSI circuits for complex systems

Course Content:
Unit I: (08 Hrs)
Review of MOS devices, MOS transistor models. PMOS, NMOS, CMOS
Unit II: (8 Hrs)
CMOS Inverter- Basic electrical properties & ckt concepts: The NMOS inverter & transfer characteristics, pull up & pull down ratios of NMOS, alternative forms of pull up the CMOS inverter & transfer characteristics CMOS inverter delays

Unit III: (8 Hrs)
Study of CMOS logic- Combination logic, gates, Compound gates, Multiplexers, memory elements. Static & Dynamic logic ckt s, Domino & Zipper logic

Unit IV: (8 Hrs)
Circuit characterization and performance, resistance and capacitance estimation, switching characteristics, power dissipation

Unit V: (7 Hrs)
CMOS processing technology- basic CMOS technology, layout design rules, stick diagram representation, latch up.

Unit VI: (6 Hrs)
CMOS circuit and logic design – transistor sizing, fan in, fan out, physical design of simple logic gates, CMOS logic structures, clocking strategies, recent trends in CMOS VLSI Design.

Text Books:

Reference Books:

BECL417 SENSORS & TRANSDUCERS [3-0-0-3] Total Hr.: [45 Hrs.]

Course Objectives:
1. To impart knowledge about the measuring instruments and the methods of measurement
2. To understand different Sensors, Transducers and Bus Architectures.
3. To study and practice calibration and testing of different instrumentation systems.
4. To understand transducers types and ranges its selection for particular applications.

Course Outcomes:
At the end of the course the student shall be able to:
1. Do error analysis associated with measurement.
2. Analyze and use the functions of various instrumentation systems.
3. Identify and Measure the sensors output for various applications.
Course Content:

Unit I (8 Hrs)
Generalized Instrumentation system, Active and Passive transducers, Digital and Analog mode of operation static and dynamic characteristics and performance of instruments. Stastical treatment of measurement of errors, caussian error distribution, probability tables, Combination of errors.

Unit II (8 Hrs)
Resistance type Transducers - potentiometer, strain gauge; Inductive type – LVDT; piezoelectric transducer Sensing elements: Temperature sensing elements – RTD, thermistor, thermocouple, cold junction compensation.

Unit III (8 Hrs)
Motion measurement: relative and absolute motion measurement of displacement, velocity and acceleration; Pressure sensing elements – manometers, elastic elements, Bourdon tube, diaphragm, bellows; electrical type, McLeod gauge, Pirani gauge; Flow sensing type – head meters [orifice, venturi], area meters, rotameters, electromagnetic flowmeter, Coriols flow meter, Ultrasonic flowmeter; pH measurement

Unit IV: (8 Hrs)
Pyrometers, Piezoelectric transducer, Magnetostriective, IC sensor, Digital transducers, Smart sensor, Fiber optic transducer, Signal conditioning techniques used in various transducers, Lineairization, gain, clipping, filtering, differential amplification, shielding techniques, various standards for signal transmission like 4-20mA current loop converter etc.

Unit V: (07 Hrs)
Recording of data CRO, data acquisition system, Industry Standard Bus architecture: PCI Bus, ISA Bus, EISA Bus, protocols, test equipments like Multimeter, signal generator, signal analyzer.

Unit VI: (06 Hrs)

Text Books:

Reference Books:
1. Patranabis D, Sensors and Transducers, Prentice Hall of India
2. E.D.doeblin, Measurement system, application and design, McGraw Hill

BECP307: MINOR PROJECT :[0-0-2-2]

Course Objectives :
1. To provide opportUnity for selection of a project
2. Search related literature, identify appropriate components
3. Design, fabricate and test a real time system by working in a group.

Course Outcomes:
At the end of the course the student shall be able to:

1. Search correct literature, select and propose a system, design, fabricate and test to develop conclusions
2. Work in a group of students of socially different backgrounds.
3. Analyze results, make conclusions and deliver by power point presentation before teachers and colleagues.

MBL105 General Proficiency –V "Employability Skills & Technical Report Writing"

For syllabus : please refer electronics engg. Departments syllabus in sixth semester

MBL 106 General Proficiency –VI Research Methodology Workshop

For syllabus : please refer electronics engg. Departments syllabus in sixth semester

OPEN ELECTIVES

For syllabus of open elective subjects, please refer syllabus provided in B.E. (Electronics Engineering) programme - Sixth Semester

SEVENTH SEMESTER


Course-Prerequisite :Communication Electronics (BECL 202), Field Theory(BECL 205)

Course Objectives :

5. To understand the concepts of microwave engineering
6. To study of microwave components, and microwave circuits.
7. To study and understand microwave test bench using Klystron amplifier and oscillator and its applications
Course Outcomes:
Student shall be able to

5. Understand and make use of microwave devices.
6. Design and implement microwave systems.
7. Analyze the designed microwave systems.
8. Analyze the S-parameter of microwave component

Course Content:
Unit I: ANTENNA (10 Hrs)
Two elements arrays and their directional characteristics, linear arrays analysis, broadside and end fire arrays pattern multiplication, binomial arrays, design of broadest array for a specific pattern Basic principles of parabolic reflectors, analysis and power pattern, lens antennas folded dipole turnstile and Yagi antenna, log –periodic antennas horn antennas, traveling wave antennas and case grain antennas Microstrip antenna – Basic Characteristics, Feeding Methods, Method of analysis Smart Antenna : Introduction, Benefits of Smart Antennas.

Unit II: MICROWAVE TUBES : (10 Hrs)

Unit III: WAVEGUIDE COMPONENTS AND APPLICATIONS (08 Hrs)

Unit IV: MICROWAVE SOLID STATE DEVICES (06 Hrs)

Unit V: STRIP LINES & MONOLITHIC MICROWAVE INTEGRATED CIRCUITS (06 Hrs)

Unit VI : MICROWAVE MEASUREMENTS (05 Hrs)

Text Books:

Reference Books:

BECP 306: MICROWAVE ENGINEERING
Total Hrs: 20

LIST OF EXPERIMENTS :
1. Study of different microwave guide components.
2. Study of characteristics of Klystron tube and to determine its electronic tunning range.
3. To determine the frequency and wavelength in a rectangular wave guide working on TE10 mode.
4. To determine the standing wave ratio and reflection coefficient.
5. To measure an unknown impedance with smith chart.
6. To study VI characteristic of Gunn diode.
7. To study the following characteristic of Gunn diode.
8. Output power and frequency as a function of voltage.
9. Square wave modulation through PIN diode.
10. Measure the polar pattern and gain of a wave guide horn antenna.
11. To study the function of multi hole directional coupler by measuring the parameters.
13. To study the Attenuators.
14. To verify characteristics of Microstrip Components.
15. Open ended experiment.

BECL410 EMBEDDED SYSTEMS [3-0-0-3] Total Hr.: [45 Hrs.]

Course-Prerequisite: Microprocessor Based Systems (BECL303)

Course Objectives:
1. To study and understand various embedded systems.
2. To understand the design parameters of embedded systems applications.
3. To study and impart different tools for embedded system design.

Course Outcomes: Student shall be able to
1. To understand structure and programming of microcontrollers.
2. To design & implement microcontroller based embedded systems.
3. To use software and hardware tools for embedded system design.

Course Content:
Unit I: (8 Hrs)

Unit II: (8 Hrs)
8051 Instruction Set, Addressing modes & programming, 8051 Timers, Serial I/O

Unit III: (8 Hrs)
Memory Interfacing. Programming, Real time interfacing with LED, LED display, LCD display

Unit IV: (8 Hrs)
RISC Controller: PIC Micro-controllers – overview; features, PIC 16c6x/7x architecture, file selection Registers.

Unit V: (7 Hrs)
RISC Controller :PIC Micro-Controllers(PIC 16c6x/7x)- Memory organization, Addressing modes, Instruction set, Timer Modes and Serial I/O, Programming.

Unit VI: (6 Hrs)

Industrial Interfacing Buses: PCI, ESA, EISA, I2C, USB, RS232, recent trends in embedded systems.

Text Books:

Reference Books:

BECL413 WIRELESS COMMUNICATION [3-0-0-3] Total Hr.: [45 Hrs.]

Course-Prerequisite: Computer Networks (BITL302), Communication Protocol Design (BECL427), Wireless Sensor Networks (BECL 428)

Course Objectives:
1. To understand the concept of wireless communication
2. To study the design and implementation of wireless system
3. To understand and explain protocol design issues and protocol designs for wireless communication.

Course Outcomes: Student shall be able to
1. Understand the basic concept of wireless communication
2. Analyze the GSM /TDMA techniques and systems
3. Conceptualize different wireless LAN technologies

Course Content:
Unit I: (07 Hrs)
Introduction to wireless telecommunication systems and Networks, History and Evolution Different generations of wireless cellular networks 1G, 2g,3G and 4G networks.

Unit II: (07 Hrs)
Characteristics of air interface, Path loss and fading models, Area Coverage, Coding and Modulation techniques, Diversity techniques, Diversity Combining Techniques, Common Cellular System components,
Common cellular network components, Hardware and software, views of cellular networks, 3G cellular systems components, OFDM, UWB radio techniques Cellular component identification Call establishment.

**Unit III (08 Hrs)**
Wireless network architecture and operation, Cellular concept Cell fundamentals, Capacity expansion techniques, Cellular backbone networks, Mobility management, Radio resources and power management Wireless network security

**Unit IV (08 Hrs)**
GSM and TDMA techniques, GSM system overview, GSM Network and system Architecture, GSM channel concepts, GSM identifiers. GSM system operation, Traffic cases, Cal handoff, Roaming, GSM protocol architecture. TDMA system, GSM system operation, Traffic cases, Cal handoff, Roaming, GSM protocol architecture. TDMA systems.

**Unit V (08 Hrs)**
Wireless Modulation techniques and Hardware, Characteristics of air interface, Path loss models, wireless coding techniques, Digital modulation techniques, OFDM, UWB radio techniques, Diversity techniques, Typical GSM Hardware.

**Unit VI (07 Hrs)**
Introduction to wireless LAN 802.11X technologies, Evolution of Wireless LAN Introduction to 802.20X technologies in PAN Application and architecture Bluetooth Introduction to Broadband wireless MAN, 802.16X technologies, emerging trends in wireless communication.

**Text Books:**

**Reference Books:**

**Course Objectives**
1. To understand the basic concepts of fiber optical Communication.
2. To understand photonic systems, modulation formats and multiplexing technologies for OFC
3. To study and understand technologies for optical fiber measurement.

**Course Outcomes:**
Student shall be able to

1. Analyze and Understand Terabit per second optical communication systems and associated technologies
2. Select, design and implement appropriate technologies for the implementation of optical fiber systems.
3. Perform experiments on optical communication set Ups and interpret results of experimentation

**Course Content:**

**Unit I: (8Hrs)**
Overview of Optical fiber Communications, Principle of optical communication – Attributes and structures of various fibers such as step index, graded index mode and multi mode fibers. Propagation in fibers – ray mode, Numerical aperture and multi path dispersion in step index and graded index fibers. Material dispersion and frequency response. Self phase modulation, combined effect of dispersion and self phase modulation

**Unit II: (7 Hrs)**
Electromagnetic wave equation in step index and graded index fibers modes and power flow in fibers. Manufacture of fibers and cables, fiber joints, splices and connectors.

**Unit III: (7 Hrs)**

**Unit IV: (7 Hrs)**
Optical sources – LED and laser diode, principles of operation, concepts of line width, phase noise, switching and modulation characteristics – typical LED and LD structures.

**Unit V: (08Hrs)**
Photo detector – Pn detector, pin detector, avalanche photodiode – Principles of operation, concepts of responsivity, sensitivity and quantum efficiency, noise in detection.

**Unit VI: (08 Hrs)**
Optical switching Fiber Optical Measurements. ANALOG AND DIGITAL LINKS: Analog links – Introduction, overview of analog links, CNR, multichannel transmission techniques, RF over fiber, key link parameters, Radio over fiber links, microwave
photonics. Digital links – Induction, point-to-point links, System considerations, link power budget, resistive budget, short wave length band, and transmission distance for single mode fibers, Power penalties, nodal noise and chirping, Recent development in optical communication.

Text Books:

Reference Books:

BECP 414 OPTICAL COMMUNICATION
Total Hrs: 20

List of Experiments
1. To Set up Fiber optic analog link & Measure power in optical fiber.
2. To study of pulse amplitude modulation.
3. Study of Time division multiplexing [Analog ]
4. Study of losses in Optical fiber.
6. Study of Time division multiplexing
7. Study of framing in Time division multiplexing.
8. Study of Marker in Time division multiplexing.
10. Study of Voice coding & coder chip.
11. Setting up a Fiber optic digital link.
12. Study of pulse position modulation.
13. RS 232 interface using optical fiber.
15. To study characteristics of fiber optic LED & photodetector.
16. Study of OTDR.
17. Study of attenuation loss using OTDR.
18. Detect location of Fault in Optical Fiber.
19. Set up optical video link & measure power.
20. Design an optical Communication link.
21. Open ended experiments.

Course Objectives
1. To study the basic theory & algorithms used in digital image processing
2. To expose students to current technologies and issues those are specific to image processing systems.
3. To understand and study the issues like segmentation, transforms etc used for the image processing.
4. To understand MATLAB tool boxes and their uses for applications of image processing

Course Outcomes:
Student shall be able to
1. Understand the basics of digital image processing
2. Understand and analyze algorithms for digital image processing
3. Design and implement algorithms for applications of digital image processing

Course Content:
Unit I:
Origins of digital image processing, Various Imaging techniques, components of an image processing system, Image sensing and acquisition, Image sampling and quantization, neighbors of a pixel, Adjacency, Connectivity, Regions and boundaries.

Unit II:
Basic intensity transformation and spatial filtering, Image negatives, log transforms, power-law transformations, median filtering, Histogram equalization, Histogram matching spatial correlation and convolutions

Unit III:
Two-dimensional orthogonal and Unitary Transforms, properties of Unitary transforms 2D-DFT, Cosine transforms, Sine transforms, Hadamard transform, Haar transforms, Slant transforms.

Unit IV:
Model of image Degradation/Restorations process, Noise models, Restoration in the presence of noise only, periodic noise reduction by Frequency domain filtering, Image reconstruction from Projections, Image compression models, Huffman coding, LZW coding, Run length coding, Bit-plane coding.

Unit V:
Some basic morphological algorithms, Boundary extraction, convex hull, thinning, skeletons, morphological Reconstruction. Color image processing, color models, RGB color models, CMY and CMYK color models the HSI color models.

Unit VI:
Image segmentation, Fundamentals, Point, Line and edge detection, of segmentation, Thresholding, Region-based segmentation, watershed segmentation
Algorithm Applications of segmentation, latest development in digital image processing.

**Text Books:**

**Reference Books:**

**BECL424: APPLICATION SPECIFIC INTEGRATED CIRCUITS DESIGN [3-0-0-3] Total Hr.:[45 Hrs**

**Course-Prerequisite:** CMOS VLSI DESIGN (BECL406)

**Course Objectives**
1. To impart and demonstrate how mechatronics integrates knowledge from different disciplines in order to realize engineering and consumer products.
2. To understand continuous-time control design using software, for the manipulation, transmission, and recording of data.

**Course Outcomes:**
- Student shall be able to
  1. Select suitable actuators, sensors and transducer and integrate them with embedded systems.
  2. Implement a continuous-time control design using software
  3. Demonstrate how Mechatronics integrates knowledge from different disciplines in order to realize engineering and consumer products that are useful in everyday life.

**Course Content:**
**Unit I: INTRODUCTION TO MECHATRONICS (08 Hrs)**
Definition of Mechatronics, Basic Characteristics of measuring device like Static & Dynamic Characteristics as Accuracy, Precision, Resolution, Repeatability, Reproducibility, Drift, Hysteresis, Linearity, Sensitivity, Threshold, Speed of response, Measuring Lag, Fidelity, Static Error & Dynamic error calculations. Scope & its importance with respect to inter disciplinary approach,
Role of electronics in mechatronics, Mechatronics system design approach with reference to robotics & Automation Printer & Elevator systems [overview]

**Unit II: OVERVIEW OF SENSORS AND TRANSDUCER & THEIR CHARACTERISTICS, SPECIFICATIONS (09 Hrs)**

**Unit III: SIGNAL CONDITIONING & DATA ACQUISITION & CONTROLLER (08 Hrs)**
Use of Wien Bridge, Wheatstone bridge, Instrumentation amplifier [IC based AD 633,AD 522/524] for above sensors & Transducers, Specifications of A/D & D/A converter related to mechatronics applications, Interfacing of inputs & Outputs with Micro controller with [89C series & PIC Micro controller], Interfacing of Sensors with PLC, PLC’s selection criterion & their specifications

**Unit IV: DATA PRESENTATION & DATA LOGGING SYSTEM (07 Hrs)**

**Unit V: ACTUATORS (08 Hrs)**

**Unit VI: STUDY DIFFERENT APPLICATIONS OF MECHATRONICS AS CASE STUDY (5 Hrs)**
**CASE STUDY 1** : Mechatronics Design of a Coin Counter.
**CASE STUDY 2** : Mechatronics Design of a Robotic walking Machine.
**CASE STUDY 3** : Strain Gauge /LVDT based Weighing machine.
**CASE STUDY 4** : Rotary optical Encoder
**CASE STUDY 5** : Skip control of CD player.

**Text Books:**

**Reference Books:**

**BECL 428 WIRELESS SENSOR NETWORKS [3-0-0-3] Total Hrs:[ 45 Hrs**

**Course-Prerequisite :Sensors & Transducers (BECL417)**

**Course Objectives:**
1. To learn the basics of wireless sensor network
2. To understand the concepts of ad-hoc and sensor networks, their applications and typical node and network architectures.
3. To study protocol design issues (especially energy-efficiency) and protocol designs for wireless sensor networks
4. To understand the applications of WSN

**Course Outcomes:** Student shall be able to
1. Analyze and explain the concept of ad-hoc and sensor networks, their applications and typical node and network architectures.
2. Design and explain protocols for wireless sensor networks.
3. Designs set up and evaluate measurements of protocol performance in wireless sensor networks

**Course Content:**

**Unit I:** (08 Hrs)
Introduction – motivation, applications, sensors, architectures, platforms for WSN, Actual Systems - Berkeley motes, TinyOS and nesC.

**Unit II:** (08 Hrs)
How to program actual WSN. Wireless Radio Realities – radio irregularities and impact on protocols, MAC protocols – B-MAC, multi-channel MAC, Routing,

**Unit III** (07 Hrs)
Directed Diffusion, Clock Synchronization, Localization – TDOA, Walking GPS, range free solutions

**Unit IV:** (07 Hrs)
Power Management – per node, system-wide, sentry services, sensing coverage, Data Services and Databases – architectures, queries [SQL],

**Unit V:** (08 Hrs)
Data dissemination, Programming Abstractions – programming models, EnviroTrack, new APIsSecurity and Privacy – problems, attacks, solutions.
Unit VI: (07 Hrs)

Text Books:

Reference Books:

BECL 415 RADAR & SATELLITE COMMUNICATION [3-0-0-3] Total Hr. :[45 Hrs]

Course-Prerequisite :Digital Communication (BECL 403), Communication Electronics (BECL 202), Microwave Engineering (BECP 306)

Course Objectives
1. To impart working principles and concepts of radar and satellite communication system.
2. To impart knowledge of different components in Radar and satellite communication.
3. To understand the orbital aspects and components of a satellite communication system.
4. To study the link budget of a satellite communication system and study of satellite orbits and launching.

Course Outcomes: Student shall be able to
1. Acquire the expertise in specialized areas of RADAR Engineering
2. Acquire the technical competence in specialized areas Satellite Communication.
3. Understand the spacecraft subsystems and satellite earth station technologies.

Course Content:
Unit I (06 Hrs)
RADAR Range Equation, CW and FM modulated RADAR, MTI and Pulse Doppler RADAR, Tracking RADAR.

Unit II (07 Hrs)
RADAR antennas, parabolic reflector, Scanning field reflector, Lens antennas RADAR Receivers, Displays and Duplexer, Detection of RADAR; signals in noise.

Unit III : (07 Hrs)
RADAR clutter, Effects of weather on RADAR, Detection of targets in Precipitation, Synthetic Aperture RADAR, HF over the Horizon RADAR.

Unit IV : (10 Hrs)
Introduction: Origin of Satellite communication, Current state of satellite communication. Orbital aspect of satellite communication: Orbital mechanism, equation of orbit, locating satellite in orbit, orbital elements, and orbital perturbation. Space craft subsystem: Attitude and orbit control system, Telemetry tracking and command power system, and communication subsystem. Satellite link design: System noise temperature and T / T ratio, down link design, domestic satellite system, uplink design, design of satellite link for specified [C / N].

Unit V : (08 Hrs)
Propagation on satellite: Earth’s path – propagation effects, atmospheric absorption, Scintillation effects, Land and Sea multipath, Rain and ice effects, Rain drop distribution, calculation of attenuation. Rain effects on Antenna noise temperature.

Unit VI: (07 Hrs)
Earth Station technology: Earth Station design; antennas tracking, LNA, HPA, RF multiplexing, factors affecting orbit utilization, tracking, equipment for earth station, recent trends in radar and satellite communication.

Text Books:

Reference Books:

ELECTIVE – III Robotics[3-0-0-3]
Total Hr.:[45 Hrs.]

Course-Prerequisite :Control System Engineering (BEEL 312)

Course Objectives
1. To understand various advanced microcontrollers.
2. To understand basic electronic components used in robotics
3. To study motion actuators and with sensors.
4. To understand electric ladder diagrams and their design methods.

Course Outcomes:
Student shall be able to
1. Analyze and implement design of electric ladder diagrams and methods of robots.
2. Design robot with electronics components like Motion actuators and with sensors.

**Course Content:**

**Unit I:** (08 Hrs)
Automation and Robotics, Robot anatomy, configuration of robots, joint notation schemes, work volume, introduction to manipulator kinematics, position representation, forward and reverse transformations of a 2- DOF arm, a 3- DOF arm in two dimension , a 4 – DOF arm in three dimension, homogeneous transformations in robot kinematics, D-H notations, solving kinematics equations, introduction to robot arm dynamics.

**Unit II:** (08 Hrs)
Basic control system models, slew motion, joint – interpolated motion and straight line motion, controllers like on/off, proportional, integral, proportional plus integral, proportional plus derivative, proportional plus integral plus derivative.

**Unit III** (07 Hrs)
Robot actuation and feedback components position and velocity sensors, actuators and power transmission devices, mechanical grippers , vacuum cups, magnetic grippers, pneumatic, electric , hydraulic and mechanical methods of power and control signals to end effectors.

**Unit IV** (08 Hrs)
General considerations in robot material handling, material transfer applications, pick and place operations, palletizing and related operations, machine loading and unloading, die casting, plastic molding, forging, machining operations, stamping press operations using robots.

**Unit V** (07 Hrs)
Use of robot in spot welding continuous are welding, spray coatings, Robots in Assembly Operations.

**Unit VI** (07 Hrs)
Robot cell layouts , multiple robots and machine interface, other considerations in work cell design, work cell control, interlocks, error detection and recovery, work cell controller, robot cycle time analysis, latest trends in ROBOTICS.

**Text Books:**

**Reference Books:**

**BECL 422**
**MICROELECTROMECHANICAL SYSTEMS (MEMS) [3-0-0-3] Total Hr.: [45 Hrs]**

**Course-Prerequisite :** CMOS VLSI DESIGN (BECL406)

**Course Objectives:**
1. To study functionality of Micro Electro Mechanical systems
2. To understand design of sensors and actuators.
3. To impart the knowledge of interfacing mechanical systems with computer and electronics systems.

**Course Outcomes:**
Student shall be able to

1. Use materials for common micro-components and devices.
2. Choose a micromachining techniques for designing of MEMS,
3. Get introduced to RF based MEMS modules are used in automobiles, aerospace technology, biomedical applications, ink jet printers, wireless and optical communications.

**Course Content:**

**Unit I:** (10 Hrs)

**Unit II:** (08 Hrs)
Microelectronic technologies for MEMS, Micromachining Technology, Surface and Bulk Micromachining, Micromachined.

**Unit III:** (08 Hrs)
MEMS sensors and actuators, Micro sensors, Mechanical, Inertial, Biological, Chemical, Acoustic.

**Unit IV:** (08 Hrs)
Microsystems Technology, Integrated Smart Sensors and MEMS, Interface Electronics for MEMS.

**Unit V:** (06 Hrs)
MEMS Simulators, MEMS for RF Applications.

**Unit VI:** (05 Hrs)
Bonding & Packaging of MEMS, RF MEMS, and Optical MEMS, Recent development in MEMS technology.

**Reference Books:**
BECL 425 REAL TIME OPERATING SYSTEMS [3-0-0-3] Total Hr.: [45 hrs]

Course Objectives:

1. To understand the characteristics and issues in real-time operating systems
2. To study the timing requirements of real-time systems
3. To understand the different architectures and design specifications of real-time operating systems and real-time applications.
4. To impart hard and soft real-time systems
5. To describe scheduling algorithms for hard real-time systems

Course Outcomes:

Student shall be able to:

1. Identify the functions of operating system
2. Evaluate the need for real-time operating system and distinguish a real-time system from other systems
3. Implement the real-time operating system principles

Course Content:

Unit I: (10 Hrs)

Unit II: (08 Hrs)

Unit III: (08 Hrs)
DECLARATIVE SPECIFICATIONS: Regular Expressions and Extensions, Traditional Logics-Propositional Logic, Predicates, Temporal Logic, real time Logic.
DETERMINISTIC SCHEDULING: Assumptions and Candidate Algorithms, Basic RM and EDF Results, Process Interactions-Priority Inversion and Inheritance.

Unit IV: (08 Hrs)

Unit V: (06 Hrs)

Unit VI: (05 Hrs)
OPERATING SYSTEMS: Real Time Functions and Services, OS Architectures-Real Time UNIX and POSIX, Issues in Task management- Processes and Threads, Scheduling, Synchronization and communication, Emerging trends in real time operating systems.

Text Books:

BECL 416 MOBILE COMMUNICATION [3-0-0-3] Total Hr.: [45 Hrs.]

Course Prerequisite: Computer Graphics & Visualization (BCL312), Communication Protocol Design (BCL427), Telematics (BCL315)

Course Objectives

1. To understand the radio wave propagation and interference in mobile communications.
2. To understand the basic knowledge about the generations of mobile communication.
3. To study different architectures of mobile communication and its related parameters.
4. To impart the knowledge about applications of mobile communication.

Course Outcomes:

Student shall be able to:
1. Understand the cellular systems
2. Analyze the concept of switching systems and base station subsystem
Course Content:

Unit I: (08 Hrs)
The cellular concept, Evolution of mobile radio communication, Cellular telephone system, frequency reuse concept, channel assignment and handoff strategies, interference and system capacity, trunking and grade of service, improving capacity in cellular system.

Unit II: (08 Hrs)
The mobile radio environment, causes of propagation path loss, causes of fading – long term and short term, definition of sample average, probability density function, cumulative probability distribution, level crossing rate and average duration of fade, delay spread, coherence bandwidth, intersymbol interference.

Unit III: (08 Hrs)
Modulation techniques and multiple access technique for mobile communication: BPSK, QPSK. Transmission and detection techniques in mobile, 4 QPSK transmission and detection techniques. QAM, GMSK Technique. Multiple access Techniques: Introduction to multiple access, FDMA, TDMA, spread Spectrum Multiple Access, Frequency Hope Multiple access [FHMA] ,Code Division multiple access [CDMA],Space Division Multiple access [SDMA].

Unit IV: (08 Hrs)
Equalization, diversity and channel coding: fundamentals of equalization, space polarization, frequency and time diversity techniques, space diversity, polarization diversity, frequency and time diversity , fundamentals of channel coding.

Unit V: (07 Hrs)
GSM – Global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM frame structure, signal processing GSM, introduction to CDMA, digital cellular standard. GPS Technology, GPS Receiver.

Unit VI: (06 Hrs)
Introduction to 3G: UMTS, CDMA [IS-95] Frequency and channel specification ,forward CDMA channel ,Reverse CDMA channel, recent advancements in mobile communication.

Text Books:

Reference Books:

Reference Books:

BECP 408:Project Phase-I : Project Seminar [0-0-4-2]

Course Objectives

1. To understand and study the process of literature review and to put forward the findings.
2. To get the detailed practical knowledge about latest technology by designing any system or prototypes by using acquired technical knowledge and skills.

Course Outcomes:
Student shall be able to

1. Effective use, interpret the literature and data for the cause of project execution
2. Use the acquired technical knowledge to solve any problem.
3. Present, prepare and deliver the seminar as team member

EIGHTH SEMESTER

BECP 411 : Industry Project Internship [0-0-30-20]

BECP411

Course Objectives

1. To expose and explore students to potential employers
2. To gain on job experience in an industry/research environment so as to help students to meet requirements of career prospects
3. To satisfy curiosity and sharpen up research potential at research organization for research minded students
4. To develop personality and soft skills
5. Provide opportunity to undertake real time, innovative and research based project in industry
6. To gain knowledge of managerial aspect such as finance, team work, team leading, testing etc followed by industry while conducting project
7. To facilitate students Interaction in product development process in industries and organization

Course Outcomes
Student shall be able to

1. Apply the knowledge gained in theory and to integrate theory with practice followed in industry
2. Realize sense of responsibilities in view of project implementation
3. To understand the functional behavior of organization
4. Work as a member of diverse technical team and to develop project/product
5. Use software, hardware, testing and simulation tools and platforms used in industry for project/product design and development
6. Interpret the literature and data for project execution
7. Understand cost effectiveness while designing and implementing project/product
8. Present, prepare and deliver seminar as a member of project team and interpret results to present conclusions
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**ELECTIVE -I**
- BEEL401 Industrial Instrumentation and Automation
- BECL303 Microprocessor Based Systems
- BEEL402 Electrical Energy Management
- BECL405 Digital Signal Processing

**OPEN ELECTIVES:**

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**Elective –II**
- BEEEL409  **OPTIMIZATION TECHNIQUES**
- BEEEL410  **ELECTRICAL INSTALLATION & DESIGN**
- BEEEL411  **EHV-AC & HVDC TRANSMISSION.**
- BEEEL501  **ADVANCED POWER SYSTEM STABILITY**
- MBAL101  **ENTREPRENEURSHIP DEVELOPMENT**

**Elective –III**
- BEEEL502  **ADVANCED ELECTRICAL DRIVES**
- BEEEL503  **ELECTRIC VEHICLES**
- BEEEL504  **ADVANCED POWER ELECTRONICS**
- BEEEL505  **MODERN CONTROL SYSTEMS**
- BEEEL506  **FUZZY & NEURAL APPLICATIONS**
- BEEEL405  **FLEXIBLE AC TRANSMISSION SYSTEMS**
THIRD SEMESTER

BAML 202: APPLIED MATHEMATICS-III [3-1-0-4]  
Total Hrs: 45

Pre-requisite: - Applied Mathematics – II (BAML 201)
Co-requisite: -

Course Objectives:
1. To introduce the concepts of Laplace transforms, Fourier series. Partial differential equations, Matrices, Numerical methods and Z Transform.
2. To explain the physical significance and applications of above mathematical tools in electrical engineering.

Course Outcomes:
Upon successful completion of the course, students shall be able to:
1. Simplify complex problems with few assumptions and estimate the reasonableness of solutions.
2. Understand the physical significance of mathematical descriptions in time domain, frequency domain,
3. Understand the mathematical descriptions in fourier series, differential equations, matrices and complex algebra.

UNIT I: LAPLACE TRANSFORMS:  
(7 Hrs)
laplace transformer and their simple properties, simple application of laplace transform to solve ordinary differential equation including simultaneous equations, salutation of one dimensional partial differential equation by transform method.

UNIT II: FOURIER SERIES AND SIGNAL SPECTRA:  (7 Hrs)
Introduction, The fourier theorem, evaluation of fourier coefficient, consideration of symmetry (odd, even, rotational), exponential form: Fourier series, integral theorem, fourier transform and continues spectra.

UNIT III: PARTIAL DIFFERENTIAL EQUATION:  (6 Hrs)
Partial Differential Equation of first order and first degree-Lagranges form, linear homogenous equations of higher order with constant coefficients. Method of separation of variable application to transmission line.

UNIT IV: MATRICES:  
(7 Hrs)
Invers of matrix by adjoint method and it used in solving simultaneous equation, rank of matrix, consistency of system of equation, inverse of matrix by portioning method, linear dipendance, liner and Orthogonal Transformation. Characteristic equation Eigen values and Eigen vectors, Reduction to diagonal form, cayley–Hamilton Theoram (Withought Proof) Statement and verification. Sylfetors thermo, association of matrices with linear differential equation of second order with constant coefficient, determination of largest eigen value and Eigen vector by iteration method.

UNIT V: NUMERICAL METHODS:  
(7 Hrs)

UNIT VI: THE Z-TRANSFORM:  
(7 Hrs)
Z-Transform, invers Z-Transform Relationship of the Fourier transform to Z-Transform, properties of z-Transform convolution of two sequence, poles and zeros, the inverse from by partial fraction expension, The inverse Z-Transform by partial properties, solution of difference equations.

Advanced topic on the subject.

Text Books:

Reference Books:

List of Practical: (If any) -

BEEL 201: NETWORK THEORY [3-1-0-4]  
Total Hrs: 40
Pre-requisite: - Basic Electrical (BEEL106)
Co-requisite: -

Course Objectives:
1. The subject aims at introducing basic components
2. To study various sources and circuit analysis method used in electrical system and their behavior
3. To study various numerical methods

Course Outcome:
At the end of the course the student shall be able to:
1. Simplify circuits using mathematical tools, network theorems or network reduction approach.
2. Understand the analysis techniques of electrical networks.
3. Understand the synthesis & analysis of passive networks

Unit I: Nodal and Mesh analysis  
(8 Hrs)
Nodal and Mesh analysis basic equilibrium equations, matrix approach for complicated network, containing voltage, current sources, Mutual Inductances, source transformations, Duality.

**Unit II: Network Theorems: (7 Hrs)**
Superposition, Reciprocity, Thevenin’s, Norton’s, maximum power transfer, compensation, Tellegen’s theorem as applied to A.C. circuits.

**Unit III: (5 Hrs)**
Trigonometric and exponential Fourier series. Discrete spectra and symmetry of waveforms, synthesis, steady state response of a network to non sinusoidal periodic inputs. Fourier transforms and continuous spectra.

**Unit IV: (7 Hrs)**
Laplace transformation and its properties, partial fractions, singularity functions, waveform synthesis. Analysis of RC & RL network with and without initial conditions with Laplace transformation, evaluation of initial & final conditions.

**Unit V: (6 Hrs)**
Transient behaviors, concept of complex frequency, Driving points and transfer functions, poles, zeros of admittance function, their properties, sinusoidal response from Pole-zero locations, convolution theorem and integral solution.

**Unit VI: (7 Hrs)**
Two port network parameters and interconnections study of series and parallel resonance in A.C. Three Phase unbalanced circuits and power calculations. Introduction of Basic filters (R-C, L-C). Advanced topic on the subject

Text Books:

Reference Books:

**BEEP 201: NETWORK THEORY LAB [0-0-2-1]**

**List of Practicals:**
1. To determine the value of $V_{TH}$ & $R_{TH}$ for the different values of $V_i$ using Thevenin’s theorem.
2. To determine the value $I_N$ & $R_N$ for the different values of $V_i$ using Norton’s theorem.
3. To verify reciprocity theorem.
4. To verify maximum power transfer theorem.
5. To find open circuit impedance, (Z) parameters of two port network.
6. To find short circuit admittance (Y) parameters of two port network.
7. To determine hybrid (H) parameters of two port network.
8. To determine transmission parameters (ABCD) of interconnected two port networks.
9. To analyze networks using PSIM software.
10. To analyze networks using MATLAB software.
11. To find cut-off frequency of high pass filter.
12. To obtain transient response of RL circuit.
14. To observe frequency response of bandpass filter on software.
15. To plot the magnitude & phase response of a series resonant band-stop filter.
16. To find cut-off frequency of low pass filter.
17. To calculate resonant frequency of RLC series resonant circuit.
18. To calculate resonant frequency of RLC parallel resonant circuit.
19. Open Ended Experiment

**BECL 201: ELECTRONIC DEVICES & CIRCUITS (3-1-0-4)**

Total Hrs: 40

Pre-requisite: - Basic Electronics (BECL105)
Co-requisite: -

Course Objectives:
1. The subject aims at introducing basic Electronic circuits, components and their applications in Electrical & Electronics engineering.

Course Outcome:
1. Understand the characteristics and applications of various electronic devices.
2. Design, analyze and interpret the circuits in a systematic manner.
3. Build, select the best circuits, make measurements, test and troubleshoot for their desired applications.

**Unit I: PN Junction Diode (8 Hrs)**
Open Circuited junction, forward and reverse bias, VI Characteristics, Dynamic Resistance, Temperature dependence, Avalanche and Zener Break Down, Photo Diode, LED’s, LCD’s, Varactor Diode, Tunnel Diodes, Power Supplies: Rectifiers Half and full wave rectifiers with filters.

**Unit II: Junction Transistors (7 Hrs)**
Theory of operation, Static Characteristics, Break down voltages, Current voltage, Power Limitations, Biasing BJT, Different Biasing arrangement, Stability factor, thermal
runaway, Power Transistors.. Regulators: Design of Shunt & Series regulators, Introduction to SMPS, Small Signal Analysis, CE, CB, CC Amplifiers and Comparison

**Unit III: Amplifier & Oscillators (8hrs)**

**Unit IV: Field Effect Transistor (6 Hrs)**
Field Effect Transistor, MOSFET, Principles of operation and characteristics, Biasing arrangement, small signal analysis of CG, CB and CD High frequency analysis.

**Unit V : Cmos Vlsi (6 Hrs)**
An introduction to CMOS VLSI design, CMOS Technology, Diode and MOSFET, Transistors, MOSFET Switches, Transmission Gate, Inverter - DC, AC Analysis.

**Unit VI : VLSI Design Methodologies (5 Hrs)**
Diagrams Layout, Types of ASICs, Package Types, Memory, I/O cells selection, Transmission Lines, Interconnects effects. Advanced topic on the subject

**Text Books:**

**Reference Books:**

**BECP 201: ELECTRONIC DEVICES & CIRCUITS LAB**
1. To plot the V-I characteristics of PN junction diode & to perform simulation on Micro-cap.
2. To design zener Diode as a voltage Regulator & to perform simulation on Micro-cap.
3. To calculate the ripple factor and plot waveform with and without capacitive filter of half wave rectifier & to perform simulation on Micro-cap.
4. To plot I/P & O/P characteristics of common emitter transistor configuration in active region & find I/P & O/P resistance, current gain & to perform simulation on Micro-cap.
5. To design transistor shunt voltage regulator.
6. To design emitter follower type of voltage regulator using darlington pair and simulate it on Micro-cap.
7. To design class AB audio power amplifier and simulate it on Micro-cap.
8. To design a Wein Bridge Oscillator and simulate it on Micro-cap.
9. To design RC phase Shift Oscillator and simulate it on Micro-cap.
10. To plot the drain & transfer characteristics of FET in CS mode and to perform simulation on Micro-cap.
11. To verify frequency response of single stage RC coupled amplifier & to perform simulation on Micro-cap.
12. To design CMOS inverter using micro wind.

**BEEL202 ELECTRICAL MEASUREMENTS & INSTRUMENTATION (3-1-0-4) Total Hrs: 40**

**Pre-requisite:** 

**Co-requisite:** 

**Course Objectives:**
2. To study performance of various Analog and digital instruments for measurement and Instrumentation purpose.
3. To study Analogue to digital conversion & ICs in Instrumentation.

**Course Outcomes**
Upon successful completion of the course, students shall be able to-
1. Describe the operating principle of electrical/ electronic measuring instruments.
2. Identify different subsystems on an instrumentation panel and suggest the possible ways to reduce the errors in measurement.
3. Select the suitable instruments or meters for a given application and make use of transducers to convert the given physical quantity into electrical signals.

**Unit I :- Measuring Instruments (6 Hrs)**
Classification, Analog & Digital instruments, comparison of Analog & Digital instruments, advantages of digital instruments, classification of analog instruments. Indicating type instruments, recording type instruments.

**Unit II:-Measurement of Inductance and capacitance (6 Hrs)**

**Unit III:-Measuring Instruments (8 Hrs)**
Ammeters, Voltmeters, principle of moving coil, moving iron & Dynamometer type instruments, extension of range using series and shunts, errors due to extension of
range. Digital Voltmeters:- Types of DVM, Ramp type DVM, integrating type DVM. Measurement of active and reactive power in polyphase circuits using dynamometer type instruments. General theory, extension of range using C.T. & P.T. Errors in instrument transformers, applications of instrument transformers for metering & protection. TOD Meters.

Unit IV :- Generalized Instrumentation Systems: (8Hrs)
Active and passive transducers, Digital and analog mode of operation. Motion Measurement: - Relative and absolute motion measurement, measurement of velocity and acceleration. Electrical transducer for motion measurement, LVDT, piezoelectric transducers variable inductance transducer, measurement of shaft torque and power.

Unit V : Temperature Measurement & Miscellaneous Measurements: (6 Hrs)

Advanced topic on the subject

Text Books:

Reference Books:

BEEP202: ELECTRICAL MEASUREMENTS & INSTRUMENTATION LAB.

List of Practicals:
4. Measurement of low resistance by using Kelvin’s double bridge.
11. Measurement of 3-phase power by the two-watt meter method.
12. Measurement of Reactive power in 3- phase circuit by one Wattmeter method.
16. PSIM based experiment
17. MATLAB based experiment
18. Lab view based experiment
19. Open ended experiment

BEEL203: ELEMENTS OF ELECTROMAGNETICS (3-1-0-4)
Total Hrs: 40


Co-requisite: -

Course Objective:-
1. To introduce the electric & magnetic fields in detail.
2. To study the laws related to electric and magnetic fields
3. To know applications of Electromagnetic in electrical engineering applications.

Course Outcomes:
Upon successful completion of the course, students shall be able to-
1. Represent the electromagnetic phenomena &fields mathematically in different coordinate systems and to predict their output.
2. Apply Knowledge of mathematics, science and engineering to the analysis and design of electrical systems involving electric and magnetic fields.
3. Understand the design of electrical system involving magnetic fields, elementary ideas of Electromagnetic waves & uniform plane waves

Unit I: Vector Analysis (07 Hrs)
Idea of Vector & Scalars, Vector Algebra, Vector addition, vector subtraction, Dot product, Scalar product in Cartesian co-ordinates system, conversion of variables from Cartesian to cylindrical and vice-versa, Spherical co-ordinates system, Transformation of Cartesian to spherical and vice versa. Introduction to finite element analysis.

Unit II (07 Hrs)
Coulomb’s law, Electrical field intensity and electric flux Density:
Coulomb’s law, electric field intensity, field often, point charges, field due to continuous volume charge distribution, field of line charge, field of sheet charges, concept of flux density.

Unit III (06 Hrs)
Gauss’s law, Energy and Potential of charge system:
Gauss’s law, Application of Gauss’s law, divergence theorem, definition of potential difference and potential, potential of a point charges, potential field of system of charge, potential gradient, Energy density in Electrostatic field.

Unit IV (06 Hrs)
Conductors, Dielectric and Capacitance and Poisson’s and Laplace’s Equations:
Current and current density, continuity of current, metallic conductors, conductor properties and Boundary conditions, Nature of Dielectric materials capacitance and capacitances, Capacitance of parallel plate capacitor, Capacitance of two wire line, Poisson and Laplace equations.

Unit V (08 Hrs)
The Steady Magnetic Field and Magnetic Forces:
Biot Savarts law, Ampere’s Circuitual Law, Strokes theorem, Magnetic flux density, Scalar and Vector Magnetic potentials, force on moving charge, force between differential current elements, nature of Magnetic material, Magnetization and permeability, Magnetic circuits, potential energy, and forces on magnetic materials, Inductance and mutual inductances.

Unit VI (06 Hrs)
Maxwell’s equations and boundary conditions, Elementary idea of Electromagnetic waves, uniform plane wave. Advanced topic on the subject.

Text Books:

Reference Books:

MBL 102 GENERAL PROFICIENCY: -II : Foreign Language

For syllabus: please refer electronics engg. Departments syllabus in third semester

FOURTH SEMESTER

BEEL204 ELECTRICAL MACHINES –I (3-1-04)
Total Hrs: 40

Pre-requisite: - Basic Electrical (BEEL106)
Co-requisite: - Electric Drives & their control.

Course Objectives:
1. To develop familiarity with 1 ph. & 3 ph. Transformers, DC Machines, 1 ph. & 3 ph. Induction machines.
2. To study starting, breaking & reversal of AC & DC Motors.
3. To study various characteristics and Speed control for AC & DC motors.

Course Outcomes
Upon successful completion of the course, students shall be able to:
1. Understand the construction, principle, performance, control and applications of 3-phase transformers, 3-phase induction motors, 1-phase induction motors, and DC motors.
2. Demonstrate the theoretical knowledge of above machines to connect, run, control and test them for practical experimentation.
3. Acquaintance with latest trends in machine advancement and their characteristics and behavior under steady state conditions.

UNIT I (8 Hrs)
3-Phase Transformer: Transformer operation and principle, o.c. & s.c. test on three phase transformer, determination of equivalent circuit. Parameters, Regulation, Efficiency, Magnetizing current and harmonics, polarity test, various connections with vector groups. All day efficiency, Autotransformers.

Unit II (05 Hrs)
Three phase to two phase conversion, parallel operation of three phase transformer, methods of cooling, temperature rise test, maintenance of transformer, and insulation of transformer.

Unit III : D.C. Machines: (08 Hrs)
Basis principle & operation, Armature reaction & commutation, Compensating winding, interpoles. Type of excitation. Characteristics of shunt, series & compound motor and generator speed control of d.c. shunt & series motor, constant horse power & constant torque drive of d.c. motor.

Unit IV : Three Phase Induction Motor (08 Hrs)

Unit V (06 Hrs)
Starting of 3 phase I.M., speed control of I.M. by pole changing, frequency control, rotor resistance by varying supply voltage, braking, regenerative braking, plugging, dynamic braking Crawling & cogging.

Unit VI : Single Phase I.M.: (05 Hrs)
Double field revolving and cross field theory split phase motor, shaded pole motor, equivalent circuit, Torque-slip characteristics.

Advanced topic on the subject

Text Books:

Reference Books:

BEEP204: ELECTRICAL MACHINES-I LAB

List of Practicals:
1. Verification of additive and subtractive polarity on two winding transformer.
2. Conversion of two-winding transformer into auto transformer.
3. Determination of efficiency and voltage regulation of a three-phase transformer by direct loading.
4. Connection of transformer for the conversion of three phases to two phases.
5. Load test on 3 phase squirrel cage induction motor.
7. No load and blocked rotor test on 3-phase induction motor.
8. To perform load test on DC shunt generator.

Total Hrs: 40

Pre-requisite: - Electronic Devices & their Circuits (BECL201)

Co-requisite:

Course Objectives:
1. To introduce students with amplifier & time
2. To study Oscillator and converter circuits.
3. To study IC applications & Linear power supplies

Course Outcomes
Upon successful completion of the course, students shall be able to-
1. Learn differential and operational amplifiers and their application areas.
2. Learn filters, oscillators and power supply system.
3. Connect circuits based on above in-lab and perform experiments, test, take observations and make conclusions

Unit I: Differential Amplifiers (7 Hrs)
Differential Amplifier, Cascaded Differential Amplifier Stages and Level Translator, AC and DC Analysis of Cascade Amplifier, Design of two stage direct-coupled amplifier.

Unit II: Operational Amplifier Fundamentals (7 Hrs)
Operational Amplifier, Basic Op-Amp Configuration, an Op-Amp with Negative Feedback, Voltage Series and Voltage Shunt Configurations, Difference amplifiers, Instrumentation Amplifier, Specification of an Op-Amp, Offset Voltages and Currents, CMRR, Slew Rate

Unit III: General Linear Applications (05 Hrs)
Constant Current Source And Voltage Source, Summing, Scaling and Averaging Amplifiers, Voltage To Current Converter with Floating And Grounded Load, Current To Voltage Converter, Integrator and
Differentiator

Unit IV: Active Filters And Oscillators (8 Hrs)
Classification of Filters, Active Filters, First to Sixth Order Butterworth filter, Multiple-Feedback Filters (Band Pass And Band Reject Filters) IGMF configuration, All Pass Filter, Cascade Design Of Filters, Classification of Oscillators, Design of Op-amp based Phase Shift And Wein Bridge Oscillators, Square, Triangular And Saw Tooth Wave Generators

Unit V: Non-Linear Circuits And Converters (5 Hrs)
Schmitt Trigger, Voltage Comparator, Voltage Limiters And Window Detector, Clippers And Clampers, Peak Detector, Precision Rectifiers, Analog Switches

Unit VI: Specialized Ic Applications & Linear Power Supplies (8 Hrs)
The 555 Timer, Phase Locked Loops, ICL8038 Function Generator, Voltage Controlled Oscillator Basic Operation, IC based Voltage Regulator Circuits, Dual Track Voltage Regulator, Three Terminal Regulator(Fixed Regulator) Voltage Adjustment And Current Boosting Of Fixed Regulator, Merits And Drawbacks Of Linear Regulators

Advanced topic on the subject

Text Books:

Reference Books:

BECP302: ANALOG SYSTEM DESIGN LAB

List of Practicals:
1. To design and verify gain and frequency response of Inverting and Non-inverting amplifier using IC 741.
2. To design and verify gain and frequency response of Integrator and Differentiator circuit using IC 741.
3. To design adder and subtractor using IC 741.
4. To perform and simulate Clipper circuit using IC 741.
5. To design RC-Phase shift oscillator using IC 741.
6. To design and verify Astable Multivibrator circuit using IC 555.
7. To design 2nd order High Pass Filter using IC 741 and to study the frequency vs gain characteristics.
8. To design Wein Bridge oscillator using IC 741.
10. To design Low Voltage Regulator circuit using IC 723.
11. To design 2nd order Low Pass Filter using IC 741 and to study the frequency vs gain characteristics.
12. To design Schmitt Trigger circuit using op amp.
13. To design square wave generator using op amp.
14. To design Hartley Oscillator using op amp IC
15. To design Colpitts Oscillator using op amp IC

BEEL205 COMPUTER PROGRAMMING (3-1-2-5)
Total Hrs: 40

Pre-requisite: - Basics of computing(BITL104)

Co-requisite: -

Course Objective:
1. To understand the students about basics of Programming and its structure.
2. To develop the knowledge and applicability of logic of Programming.
3. To provides career opportunities in design and implementation of various programming languages and Tools.

Course Outcome:
Upon successful completion of the course, students shall be able to-
1. Develop computer programs and execute successfully to find solution for given engineering applications.
2. Develop skills to use system design notations and apply system design engineering process in order to design, plan and implement software systems.
3. Able to Develop various applications with advanced programming Tools.

Unit I: (8 Hrs)
Structure of ‘C’ program, Data types, Storage class, variables, expressions and operators.

Unit II: (6 Hrs)
Program control statements, Concept of function and Recursion, I/O through Print, scanf, File I/O Open, Close, Read and Write.

Unit III: (6 Hrs)
Arrays, Searching (Linear & Binary). Sorting (Bubble, Selection Sort) File Handling.

Unit IV: (6 Hrs)
Pointers and structures, single linked list in sorting, deletion, and updating.

Unit V: (8 Hrs)
Introduction to MATLAB programming language. MATLAB environment, Operations with variables, Arrays, Columns and rows: creation and indexing. Writing script files: Logical variables and operators, Flow control, Loop operators.

Unit VI (6 hrs)
Writing functions in MATLAB : Input/output arguments, Function visibility, path. Simple graphics: 2D plots, Figures and subplots. Basics of data types & file I/O.
Advanced topic on the subject

Text Books:

Reference Books:

BEEP-205: COMPUTER PROGRAMMING LAB.

List of Practicals:
1. Introduction to C Environment.
2. Write a program to reverse a five digit number.
3. Write a program to print the output in the format given below using for loop.
   
   A   B   C   D   E   F   G   H   I   J

4. WAP to compute sum=1+x^2/2!-x^3/3!+x^4/4!-x^5/5!......x^n/n!.
5. Write a program to merge two sorted array.
6. Write a program to solve quadratic equation in C
7. Write a program to print Fibonacci series in C
8. Write a recursive program to calculate factorial of a number
9. Write a C program to implement binary search algorithm
10. WAP to solve Bubble Sort Algorithm in C
11. WAP to Display structure of 10 Students.
12. Introduction to MATLAB environment and Study of various Matrix operations using MATLAB.
13. Write a program to draw a sine wave using MATLAB
14. Write a MATLAB function to find average of two numbers
15. Open Ended Experiments.

BECL309:MICROPROCESSOR APPLICATIONS(3-1-0-4)
Total Hrs: 40

Pre-requisite: -

Co-requisite: -

Course Objectives:
1) To introduce architecture, interfacing and programming of 8085 and different peripheral IC’s
2) To study Various Interrupts for 8085
3) To study Architecture and interface of 8255 & 8253.

Course Outcomes:
Upon successful completion of the course, students shall be able to:
1) Understand the architecture, programming, peripherals and applications of 8085 microprocessor.  
2) Develop skills to acquire extensive knowledge of microprocessor based systems and interfacing techniques.
3) Develop Programmes for given applications, execute on microprocessor, test, trouble shoot and analyse results in the lab,

Unit I: (7 Hrs)
VLSI circuit concept. Approach to integrated system design using Microprocessors. Bus concepts. Address, Data and control. Organization of computer with MPU, Bits/Bytes/Words/Long words - their ranges accuracy and precision. Memory organization. Linear/Absolute decoding.

Unit II (6 Hrs)

Unit III (7 Hrs)
Flag structure concept of PSW stacks and subroutines simple and Nested PUSH POP instruction and CALL/RETURN instruction. Stack manipulations,
simple programs.

Unit IV (6 Hrs)
Interrupts - Concept and structure in 8085. Interrupt services routines. Advanced instructions and programming of 8085A. Basic concept of Microcontroller & application

Unit V (6 Hrs)
Method of Data Transfer - Serial, parallel, synchronous asynchronous, IN/OUT instructions. Timing diagrams simple hardware interface to 8085 of standard Latches/Buffers/Keys/display devices as I/O ports. Handshaking concept. Architecture and interface of 8255 and 8253 to 8085.

Unit VI (8 Hrs)
Hardware Considerations - Bus contention. Slow memory interfacing complete signal description of 8085. Multiplexed Key board/Display interface and assembler directives. General awareness about micro computer system related products. Introduction to microcontrollers. Advanced topic on the subject

Text Books:

Reference Books:

BECP309:MICROPROCESSOR APPLICATIONS LAB (0-0-2-1)
1. Study of µp 8085 and perform arithmetic operations of two 8 bit numbers.
2. Study of µp 8085 and perform arithmetic operations of two 16 bit numbers.
3. To generate 10 no . Fibonacci series and store in memory location
4. Convert HEX number to decimal numbers.
5. Convert given HEX number into Gray code.
6. Transfer the data block from one memory location to other.
7. Find the greatest/smallest number.
8. 8) Find the even, odd and zero number.
9. Arrange the data block in the ascending /descending order.
10. Arrange of 10 BCD numbers.
11. Write a program to generate the Fibonacci series.
12. Write a program to interface LED matrix.
13. To study the 8 bit Multiplications.
14. To study the 8255 and transfer the Data block on the I/O ports.
15. To generate the square wave of period 1 sec on sod pin.
16. To convert Hexadecimal number into its ASCII equivalent.
17. To interface DAC with µp 8085.
18. To interface ADC with µp 8085.
19. Write a program to display WELCOME’ on 7-segment display.
20. Write a program to display rolling massage on display.
21. Experiment related to Microcontroller Application to power systems.
22. Open-ended experiment.

MBAL100 ENGG. ECONOMICS & INDUSTRIAL MANAGEMENT (3-1-0-4) Total Hrs: 40

Pre-requisite:

Course Objectives:
1) To make students familiar with Demand & supply,
2) To aware about Costing, Banking, Managerial aspects related to production, marketing and finance.
3) To analyze scope of financial management

Course Outcomes:
Upon successful completion of the course, students shall be able to-
1) Understand the management aspects related to demand & supply.
2) Understand costing, banking, production, marketing and finance.
3) Prepare a project report and estimate cost of the project.

Unit I: (6 Hrs)
Demand Utility and indifference curves, Approach to Analysis of demand, elasticity of demand, Measure of demand elasticity, Factors of Production, Advertising elasticity, Marginalize.

Unit II (6 Hrs)
Laws of Return and costs, price and output determination under perfect competition, monopoly,
monopolistic, competition, oligopoly, Depreciation and methods for its determination.

Unit III (8 Hrs)
Functions of central and commercial banks Inflation, Deflation, Stagflation, Direct and Indirect Taxes, Monetary and cycles, New economic policy, Liberalization, Globalization, Privatization, Market friendly state. Fiscal policy of the government, Meaning and phases of business.

Unit IV (8 Hrs)
Definition, Nature and scope of management, Functions of management - Planning, organizing, Directing, Controlling, Communicating

Unit V (6 Hrs)
Meaning of marketing management, Concept of marketing, Marketing Mix, Administrative and cost plus pricing, Channel of distribution, Advertising and sales promotion.

Unit VI (6 Hrs)

Advanced topic on the subject

Text Books:

Reference Books:

MBL103: GENERAL PROFICIENCY-III: Hobby classes

For syllabus : please refer electronics engg. Departments syllabus in fourth semester

FIFTH SEMESTER

BEEL301 ELECTRICAL MACHINES –II (3-1-0-4)
Total Hrs: 40
Pre-requisite: - Electrical Machines-I (BEEL204)
Co-requisite: - Electrical Power System –II

Course Objectives:
1) To introduce synchronous machines to students.
2) To lay firm foundation of electrical machines for understanding its behavior in power system.
3) To study special motors for industrial applications.

Course Outcomes:
Upon successful completion of the course, students shall be able to-

1. Understand the construction, principle, performance, control and applications of 3-phase synchronous machines and special motors.
2. Understand the behavior and performance of synchronous machine in power system
3. Demonstrate the theoretical knowledge of above machines to connect, run, control and test them for practical experimentation.

Unit I: Three Phase Synchronous Generators:
Introductions, constructional features of cylindrical and Salient pole rotor machines, introduction to armature winding and field windings, MMF of armature and field windings, induced EMF.

Unit II: Steady State Operation of Three Phase Synchronous Generators: Phasor diagram, regulation, steady state performance of three phase synchronous generator.

Unit III: Synchronizing of Generator with Another Generator: Parallel operation, experimental determination of parameters, short ckt ratio, losses and efficiency.

Unit IV: Synchronizing Machines On Infinite Bus: Phasor diagram, expression for torque, load / torque angle, synchronous motor operation, effects of variable excitation and power input on generator operation and effect of variable excitation and load on motor operation.

Unit V: Transient Behavior: Sudden 3- Phase short circuit. Transient and sub- transient reactance's and their measurements. Time constant and equivalent circuit diagram, damper windings.

Unit VI: Introduction To Introduction to Special Machines: Repulsion motors, AC series motors, universal motors, reluctance motor, hysteresis motor, power selsyns, position selsyns (only elementary aspects of the above types are expected).Introduction regarding application of finite element method to
electrical machines analysis .
Advanced topic on the subject

**Text Books:**

**Reference Books:**

**List of Practicals:**
1. Effect of field excitation on the generation of voltage of an alternator.
2. Determination of voltage regulation of alternator by direct loading.
3. To draw open circuit characteristics of an alternator.
4. To draw short circuit characteristics of an alternator.
5. Determination of voltage regulation of alternator by EMF method.
7. Determination of sub transient direct axis ($X_d''$) reactance and quadrature axis ($X_q''$) Synchronous reactance of an alternator.
8. Determination of negative sequence reactance of a synchronous generator.
10. Determination of potier reactance and voltage regulation of alternator by zero power factor method.
12. To plot $V$ and Inverted $V$ curve of a synchronous motor.
13. Synchronization of alternator with infinite bus by Dark lamp method
14. Synchronization of alternator with infinite bus by Bright lamp method.
15. Open ended Experiment

**BEEL302 ELECTRICAL DRIVES AND THEIR CONTROL**
(3-1-0-4) Total Hrs: 40

**Pre-requisite:** - Electrical Machines-I (BEEL 204)

**Co-requisite:** -

**Course Objectives:**
1. To introduce the fundamentals, classification, selection, control of Modern Drives.
2. To introduce concept of industry automation using PLCs & AC DC Contactors
3. To study electric traction system & recent drives used in industries

**Course Outcomes:**
Upon successful completion of the course, students shall be able to-

1. Understand the fundamentals of different types of electric drives, selection of a drive for different applications, classification & control methods.
2. Understand the programmable logic controllers, their architecture and programming methods & AC DC Contactors.
3. Understand the electric traction system & recent drives used in industries.

**Unit I:** (6 Hrs)
Definition classification and speed torque characteristics of common drive motors and then characteristics under running braking and speed control.

**Unit II:** (8 Hrs)
Selection Of Motor: Power capacity for continuous and intermittent periodic duties, flywheel effect.

**Unit III:** (6 Hrs)
PLC, its Programming and its application in electrical drives.

**Unit IV:** (8 Hrs)
AC and DC Contractors and Relays: Lock out contactors, magnetic structure, operation arc Interruption contactor rating, H.V. contactors, control circuits for automatic starting and braking of DC motor. Series parallel control with numerical. Starting and braking of traction motor.

**Unit V:** (6 Hrs)
Traction Motors: Motor Used In AC/DC Traction:- Performance and desirable characteristics requirements and suitability of motor for traction duty. Traction motor control – control of DC traction motor. Series parallel control with numerical starting and braking of traction motor.

**Unit VI:** (6 Hrs)
Brief idea about recent drives commonly used in industries. Digital control of electrical motors, Block diagram arrangement, comparison with other methods of control.

**Advanced topic on the subject**
Text Books:

Reference Books:

BEEL303 CONTROL SYSTEMS – I (3-1-0-4) Total Hrs: 40
Pre-requisite: -Network Theory(BEEL201)

Co-requisite: -
Course Objectives:
1) To introduce control system components.
2) To study control system modeling & time response analysis.
3) To study Stability aspects, Frequency response analysis and State variable techniques.

Course Outcomes:
Upon successful completion of the course, students shall be able to-
1. Develop the mathematical models from a given physical system and study it for obtaining time response analysis .
2. Learn the stability of a physical system using graphical tools such as Bode plot, Nyquist plot, Root locus etc.
3. To perform experiment on real-time system with an objective of studying Performance, responses & study the concept of state variable technique .

Unit I (08 Hrs)
Introduction to need for automation and automatic control ,use of feedback, broad spectrum of system application, Mathematical modeling,(Electrical & Electromechanical) diff. Equations., transfer functions, block diagram, signal flow graphs, application to elementary systems, simplifications, effect of feedback on parameter variations, disturbance signal servomechanism and regulators, Control system components, electrical electromechanical, their functional analysis and input output representation.

Unit II (06 Hrs)
Time response of system, first order and second order system, standard inputs, concept of gain and time constants, Steady state error, type of control system, approximate methods for higher order system.

Unit III (06 Hrs)
Stability of control systems, conditions of stability, characteristics equations, Routh- Hurwitz criterion, special cases for determining relative stability.

Unit IV (08 Hrs)
Root location and its effect on time response, elementary idea of root locus, effect of addition of pole and zero on proximity of imaginary axis.

Unit V (06 Hrs)
Frequency response method of analyzing linear system, Nyquist and Bode Plots, Stability and accuracy analysis from frequency response, open loop and close loop frequency response, Nyquist Criterion, Effect of variation of gain and addition of pole and zero on response plot, stability margin in frequency response.

Unit VI (06 Hrs)
State variable method of analysis, characteristics of system state, choice of state variables, representation of vector matrix differential equation, standard form, relation between transfer function and state variables. Recent trends in control systems. Advanced topic on the subject

Text Books:

Reference Books:

BEEP303: CONTROL SYSTEM-I LAB.
List of Practicals:
1. To plot the characteristics between position and phase of synchro transmitter
2. To measure basic step angle of stepper motor.
3. To plot speed-torque characteristics and speed Vs back emf characteristics of A.C servomotor.
4. To obtain the time response on a linear
5. To find the characteristics between position and voltage of potentiometer
6. To plot the graph between angular position of transmitter and receiver by using synchro transmitter receiver pair
7. To determine transient response of a mechanical system by using MATLAB/SIMULINK
8. Write a program to plot root locus of any system by using MATLAB software
9. To find the transient response of second order RLC series circuit by using MATLAB/SIMULINK
10. Write a program to plot bode plot of any system by using MATLAB software
11. To implement P,PI and PID controller for a system in MATLAB/SIMULINK
12. To determine the characteristics of positional error detector by using potentiometer
13. To obtain performance characteristic of dc motor speed control system
14. To rotate the stepper motor by using microprocessor kit
15. Open ended experiments

BEEL304 ELECTRICAL MACHINE DESIGN (3-1-0-4)
Total Hrs: 40

Pre-requisite: - Electrical Machines-I (BEEL 204)
Co-requisite: -

Course Objectives:
1) To introduce the design aspects and methodologies for Transformers.
2) To introduce the design aspects and methodologies for Induction Machines.
3) To introduce the design aspects and methodologies for Synchronous Machines.

Course Outcomes:
Upon successful completion of the course, students shall be able to-
1. Apply knowledge of materials used for efficient construction of transformers, synchronous and asynchronous machines.
2. Design manually the winding details, magnetic circuit and physical dimensions of transformer, synchronous machine and asynchronous machine for given output ratings.
3. Have the fundamental knowledge about softwares available for machine design.


Unit II: Transformer Design: - Specific loading, equation for voltage per turn for power and distribution transformer output equation.

Unit III: Principle of electric and magnetic circuit design method of cooling and cooling circuit design. Estimation of performance characteristics from the design data.

Unit IV: Induction Motor: - Main dimensions, output equation, loading constant estimation of axial lengths, air gap diameter, winding design.

Unit V: Induction motor:Air gap length, slot combination for stator and rotor of I.M. cage rotor and wound rotor design. Calculation of ON load current and other performance characteristics for designing.

Unit VI: Synchronous Machine: Air gap length, methods of obtaining sinusoidal O/P voltage, field coil design for salient pole machine and for turbo generator rotor, ventilation of synchronous generator, cooling air circuits, closed ventilation / quantity of cooling medium hydrogen and water as an cooling media. Design of Electrical Machines using Motor Pro Software.

Advanced topic on the subject

Text Books:

Reference Books:

BEEL305 POWER STATION PRACTICE (3-1-0-4)
Total Hrs: 40

Pre-requisite: - Network theory (BEEL 201)
Co-requisite: -
Course Objectives:
1) To introduce conventional as well as non-conventional methods of generation of electricity.
2) To study parameters related to site selection, awareness about important components of the systems.
3) To study the procedure to calculate the cost of generation.

Course Outcomes
Upon successful completion of the course, students shall be able to:
1. Understand various sources of energy that can be converted into electrical energy.
2. Understand the operation of thermal, hydro and nuclear power stations.
3. Comparative analysis of the above power stations on the basis of various aspects.

Unit-I: (08 Hrs)
Sources Of Electrical Energy: Coal oil and natural gas water power, nuclear fission and fusion. Their scope and potentialities for energy conversion. Generation different factors connected with a generating station, connected load, maximum demand, demand factor, load factor, diversity factor, plant capacity and utilization factor, load curve, load duration curve, load survey base load and peak load station, advantages of interconnection.

Unit-II: (06 Hrs)
Thermal Stations: Choice of site, location, size and number of units, general layout, major equipment, essential and non-essential auxiliaries, electric supply to auxiliaries, cost of generation, effect of different factors costs.

Unit-III: (06 Hrs)
Hydro Station: Hydrology, stream flow, flow duration curve, mass curve reservoir capacity, type of hydroplants and their field of use, pumped storages plants and their utility, surge tanks, governing characteristics of turbine and hydro generators.

Unit IV: (06 Hrs)
Nuclear Station: Principle of Nuclear energy, materials, types of nuclear reactors, breeder reactors, location, material for moderator and control rods, cost economics.

Unit V: (06 Hrs)
Voltage Control Of A.C. Generator: Exciter instability, methods of stabilizing exciter voltage, Automatic voltage regulator action.

Unit VI: (08 Hrs)
Non Conventional Techniques Of Energy Production:

i) Solar Energy: Introduction, Physical principles of conversion of solar radiation into heat, Solar energy collectors, solar energy storage, electrical power generation and other Miscellaneous applications of solar energy.


iii) Energy From Tides And Oceanic Waves: Introduction, Basic principle of Tidal power site selection storage and plant layout for Tidal power plant, Introduction to wave energy and its Energy plants, Wave energy based power plants layout, Analysis of Tidal and wave energy plants.

Recent issues related to pollution & global warming. Introduction of above content only. Introduction to Solar & Wind energy. Advanced topic on the subject

Text Books:

Reference Books:

BEERP306: ELECTRICAL WORKSHOP & DRAWING (P) (0-0-2-1)

Pre-requisite: Electrical Machines-I (BEEL204), Basic Electrical Engg, Analog system Design.
Co-requisite: Electrical Machines-II (BEEL 301)

Course Objective:
1. To introduce basic knowledge of design of transformer.
2. To study basics of circuit designs.

Course Outcome:
At the end of the course the student shall be able to:
1. Understand the design of transformer.
2. To design various electronics circuits and
component testing.

3. To operate and troubleshoot various household equipments

**List of Practicals:**

1. Application of VISIO software to draw
   i) Single line diagram of 33 kV / 11 kV substation
   ii) Connection diagram of Hingna substation
   iii) Thermal power plant layout using VISIO software
2. To find the balanced & unbalanced current of 3-phase system, using PSIM Software.
3. To design the integrator & differentiator using operational amplifier in PSIM software.
4. To find the speed of DC motor using PSIM software.
5. To draw ladder diagram for start stop logic in PLC.
6. To find the operating characteristics of 3 ph induction motor using MATLAB Simulink software.
7. To find the capacitor value required in particular load for power factor correction in MATLAB.
8. Design of 66 KV double circuit transmission tower in AUTOCAD.
9. To find the ripple factor of full wave bridge rectifier with and without capacitor using PS-CAD software.
10. To draw ladder diagram to generate output alternate pattern in PLC.
11. To find the ripple factor of half wave bridge rectifier with and without capacitor using PS-CAD software.
12. To find the active & reactive flow in power system using POWER WORLD SIMULATOR software.
13. To find the value of frequency in series resonance circuit using MATLAB.
14. Open ended experiments

**BEEP416 SELF STUDY SYLLABUS (0-0-2-2)**

**Pre-requisite:** - Electrical Power System-II
**Co-requisite:** -

**Course Objectives**

1. To provide an opportunity for learning modern electrical engineering systems/equipments without being coached by the teacher so that the ability of lifelong learning is cultivated.
2. To study and design of Electrical systems components.
3. To study and design the sub systems for efficient operation.

**Course Outcome**

1. Develop Skill for self learning without external coaching.
2. Understand various design expects for transformer, Induction motor, synchronous machine.
3. Ability to understand standard tools for design of electrical components.

**TOPIC covered:** (Topics will be referred from NPTL Lectures/ PPT available in website etc.)

1. Draw the oriented network graph for the given power system
2. Explain the Primitive network in Impedance and admittance form
3. Draw the basic cutset Incidence Matrix of the given power system
4. Draw the basic loop incidence matrix of the given power system
5. Explain the Tree and Co-tree of the given oriented graph
6. Prove that $C_b = -B_l$ of the given power system network graph
7. Prove that $B_l = A_b^{-1}A_l$ of the given power system
8. Derive the BUS impedance matrix by step by step method
9. Write the algorithm for addition of link in the given power system
10. Write the algorithm for addition of branches in the given power system
11. Write the algorithm for removal of link.
12. Develop the sequence impedance for 3-phase to ground fault
13. Develop the sequence Impedance/admittance for L-L fault
14. Develop the sequence Impedance/admittance for L-L-L fault
15. Develop the sequence Impedance/admittance for L-G fault
16. Develop the analytical expression for currents and voltages during 3-phase to ground fault conditions
17. Develop the analytical expression for currents and voltages during L-L fault conditions
18. Develop the analytical expression for currents and voltages during L-G fault
19. Develop the analytical expression for currents and voltages during L-L-L fault conditions
20. Explain the types of buses for Load flow studies
21. Explain the Convergence Criteria
22. Write the algorithm for Gauss-Seidal method for load flow analysis
23. Write the algorithm for Newton-Raphson method for load flow analysis
24. Write the algorithm for Fast Decoupled method for load flow analysis
25. Explain the comparison of Load flow methods
26. Explain the types of stability
27. Write the mathematical Model for transient stability simulation
28. Write the transient stability solution by using Runga-Kutta method
29. Write the transient stability solution by using Euler's method
30. Write the transient stability solution by using Euler's modified method
31. Explain the comparison of methods
32. Explain the flow chart for Runga-Kutta method
33. Explain the flow chart for Euler's method
34. Explain the flow chart for Euler's Modified method
35. Explain comparison of methods
36. Construction & Principle of Operation of a Synchronous Inductor type Stepping motor
37. Methods of Switching the windings & basic operation of the step motor
38. Logic Circuit for open-loop control of a 2-phase stem motor
39. Variable Reluctance (VR) stepping motor and its open-loop control
40. Closed-loop operation of step motor
41. Switched reluctance motor
42. Constructional details of SR motor & Importance of Stator and rotor pole-arc angles.
43. Design of stator and rotor pole arcs and determination of L(q)-q profile.
44. Power converter & approximate prediction of current wave form and torque
45. Prediction of supply current waveform & logic controller for forward and reverse motion
46. Position sensing of rotor with hall-probes.
47. Permanent magnet motors (conventional DC and brushless DC motor)
48. Ferromagnetic domain theory and characteristic properties of different P.M. materials
49. Construction details of pole and yoke parts of conventional PM DC motors
50. Theory of BLDM as variable speeds synchronous motor
51. Methods of reducing torque pulsation & approximate torque speed characteristics & BLDM
52. Double feed induction generator (DFIG)
53. Construction & principal of operations of a induction generators (IG)
54. Switch Reluctance motor & SR Motor.
55. Theory & BLDM as variable speed sync. Motor
56. Variable reluctance (VR) stepping motor and its open loop control
57. Close loop operation of steeper motor...
58. Design of electrical machines using motor pro-software.
60. Properties & classifications of insulating materials.
61. Explain the Design aspects of CT.
62. Explain the Design aspects of PT.
63. Automatic Generation Control.
64. Excitation system AC type.
65. Excitation system DC type.
66. Excitation system Brushless type.
67. Modeling of Turbine governor system.
68. Power system stabilizer (PSS) Models.

Books:

Suggested Readings / Video Lectures:
1. IIT Kharagpur : A.K. Sinha , Prof. Sabyasachi sengupta, Prof. P.Sasidhara Rao, DRr.Krishna Vasudevan
2. NPTEL Video Courses : Prof. M.Gopal, Prof. T.K. Basu, Prof. L. Umanand
Kunal IT learning resources: Total 07 Learning resources are available
MBL104: GENERAL PROFICIENCY-IV (ADVANCED COMMUNICATION SKILL)

For syllabus: please refer electronics engg. Departments syllabus in fifth semester

SIXTH SEMESTER

BEEL308 HIGH VOLTAGE ENGG. (3-1-0-4)
Total Hrs: 40

Pre-requisite: - Electrical Power System-I (BEEL309)
Co-requisite:

Course Objectives:
1) To introduce the conduction and electrical breakdown phenomena in liquids, solids, gases or vacuum.
2) To introduce Generation of high voltage, high current and their measurement.
3) To introduce testing units required for the installation of electrical equipments

Course Outcomes
Upon successful completion of the course, students shall be able to-
1. Understand the various aspects of breakdown mechanism in dielectrics, lightning and travelling waves.
2. Understand how high voltages can be generated, tested and measured.
3. Understand the safety requirements related with high voltage applications
4. Demonstrate the above theoretical concepts practically by experimentation in laboratory.

Unit I (07 Hrs)
Breakdown mechanism in Dielectric: Ionization process; Townsend’s criterion for breakdown in electro-negative gases, Time-lag for B.D.; Streamer theory for B.D in gases, Paschen’s law; B.D in non-uniform field. Corona discharges and introduction of corona post B.D. phenomenon and applications, Practical considerations in using gases for insulation purpose; vacuum insulation, Liquid as insulators, conduction & B.D. in pure and commercial liquids. Intrinsic, electromechanical & thermal B.D., B.D. of solid dielectrics in practice; B.D. in composite dielectrics.

Unit II (07 Hrs)
Lightning and switching over voltages: Mechanism of lightning, types of strokes, parameter and characteristics of lightning strokes, characteristics of switching surges, power frequency over voltages. Control of overvoltage due to switching. Protection of lines by ground wires, protection by lightning Arrester, gap type and gapless L.A., selection of L.A. ratings, surge-absorbers.

Unit III (06 Hrs)
Traveling waves and Insulation coordination: Traveling waves on transmission lines, Classification of lines attenuation and distortion of traveling waves, reflection and transmission of waves, behavior of rectangular waves at transition points. Introduction to insulation coordination, associated terms, impulse waveform. Introduction to BIL, Reduced BIL and SIL.

Unit IV (07 Hrs)
Generation of high voltage and currents: Generation of High D.C voltages by rectifiers, voltage doubler and multiplier, circuits (Derivations of expression not required), electrostatic machines, Generation of high AC voltages by Cascaded transformers, Resonant transformers, generation high frequency AC high voltage. Generation of impulse voltages: Standard impulse wave shapes, analyses of model and commercial impulse generation circuits, wave shape control, Marx circuit, tripping and control of impulse generation, generation of switching surges, generation of impulse current.

Unit V (07 Hrs)
Measurement of high voltage and current: Measurement of high AC and DC voltage by micro ammeter, generating voltmeter, resistance and capacitance potential divider, series impedance voltmeter, CVT, Magnetic type potential transformers, electrostatic voltmeter. Peak reading AC voltmeter, Sphere gap arrangement. Measurement of impulse voltage by potential dividers and peak reading voltimeters. Measurement of High AC/DC current, measurement of high frequency and impulse current by resistive shunt (Bifilar strip shunt only)

Unit VI (06 Hrs)
Non destructive and high voltage testing of electrical apparatus: Non destructive testing, Measurement of DC Resistivity, measurement of Dielectric constant and loop-factor (low and power frequency only), Schering bridge for high charging circuits, high dissipation factor, three terminal measurement, transformer ratio arm bridges, partial discharge measurements by straight detectors & by balance detectors, calibration of detectors, discharge detection in power cables. High voltage testing. Testing of insulators, bushings, Isolators, circuit breakers, cables, transformer, lightning arresters and power capacitors. Recent trends in industrial testing & introduction to partial discharge.

Advanced topic on the subject
Text Books:

Reference Books:

BEEP308: HIGH VOLTAGE ENGG LAB.

List of Practicals:
1. Calibration of Voltmeter by Sphere Gap method using
   1)10 c.m. diameter sphere
   2) 5 c.m. diameter sphere
2. Measurement of breakdown voltage of Pin type insulator
   1) Under dry condition
   2) Under wet condition
3. Calibration of Voltmeter by Point Gap method
4. Calibration of Voltmeter by Rod Gap method
5. Determination of breakdown voltage of Horn Gap apparatus
6. Determination of String efficiency of Suspension type insulator
7. Calibration of voltmeter for different combination of electrodes
   1) sphere 10 cm diameter and sphere 5 cm diameter
   2) sphere 10 cm diameter and point gap
8. Determination of fault location in cable by Digital cable fault locator model-2000A
9. Measurement of Capacitance of Insulating material by Eltel CTS-500 kit
10. Measurement of oil loss angle by Loss angle meter
11. Measurement of breakdown voltage of paper insulation
12. Determination of breakdown strength of transformer oil
13. Calibration of voltmeter by Sphere gap method using impulse generator
14. Measurement of Dissipation factor(Tan-Delta) of Insulating material by Eltel CTS-500 kit
15. Open ended experiment

BEEL309 ELECTRICAL POWER SYSTEM-I (3-1-0-4)

Course Objectives:
1. To introduce per unit system. cables, distribution system, transmission systems and different models to represent them
2. To introduce Load flow studies.
3. To study concepts of real and reactive power control

Course Outcomes:
1. Represent the power systems which may include generation/distribution/transmission using different models and compare them
2. Understand feeders and distributors used in elementary distribution schemes.
3. Determine the active and reactive power flow at different locations in a multibus system using load flow analysis.

Unit 1 :-
Structure of electrical power system, brief exposure of generation, transmission and distribution aspects, elementary consideration of economic bulk power supply system, use of high voltage, general system consideration, idea about substation, concept of real, reactive and complex power, Load and their characteristics, voltage and frequency dependence of loads.

Unit 2 :-
Representation of power system elements, models and parameters of generator, transformer and transmission lines, per unit system representation.

Unit 3 :-
Elementary distribution schemes: Feeders and distributors, LT and HT cables.

Unit 4 :-
Voltage regulation and efficiency of power transmission lines using simple series equivalent representation, T-representation and by circle diagram using generalized constants.

Unit 5 :-
Interconnection of system elements to form two bus system, Illustration of active and reactive power transmission. Load Flow Studies: Power system load flow equations, solution Technique; Gauss Seidel Newton Raphson and fast decoupled technique with and (without voltage control buses. Representation of tap changing and phase shifting transformers, Elementary load flow
programs.

Unit 6: (6 Hrs)
Elementary concepts of real and reactive power control, Steady state performance of turbine governors, load sharing between generators, preliminary concepts of automatic string efficiency, and types of insulators. Introduction to advanced schemes like concept of single phasing.

Advanced topic on the subject

Text Books
3. Elements of power system analysis by Stevenson, Mc Graw Hill

Reference Books
1. Westinghouse transmission and distribution handbooks, Mc Graw Hill

BEEL310 POWER ELECTRONICS (3-1-0-4)
Total Hrs: 40

Pre-requisite: - Network Theory(BEEL 201)
Co-requisite: -

Course Objectives:
1) To introduce SCR, MOSFET, TRIAC, IGBT and other power electronic devices etc along with their performance characteristics and applications.
2) To introduce different types of power electronic converters, their control and performance aspects for various applications. inverter
3) To study single phase and three phase bridge inverters.

Course Outcomes:
Upon successful completion of the course, students shall be able to-
1. Understand the structure, working, characteristics and applications of SCR, UJT, MOSFET and IGBT.
2. Understand the structure and working of various power semiconductor converters.
3. Demonstrate the above theoretical knowledge by connecting a practical circuit on bread-board, operate and test under different load conditions.

Unit I: (08 Hrs)
SCR and Its characteristics: Gate characteristics, SCR turn off, ratings, series and parallel connections of SCRs. Triac and its applications, Unijunction transistors, Triggering circuits and opto couplers.

Unit II (06 Hrs)
Line commutated converters: Working of single pulse converter, two pulse mid point converter, three pulse midpoint converter and 3 phase six pulse bridge converter, effect of source inductance in converters, effect of free wheeling diode.

Unit III (06 Hrs)
Single phase and three phase half controlled converters: Speed control of d.c. motors using line commutated converters. Cycloconverters (single phase).

Unit IV (08 Hrs)
Static controllable switches: Characteristic and working of MOSFET Gate turn off Thyristers and insulated gate bipolar transistor, protection of SCR gate circuit protection, over voltage and over current protection, snubber circuit design, convertor circuit faults and their protection. Advanced power electronics devices.

Unit V (06 Hrs)

Unit VI (6 Hrs)
Single phase and three phase bridge inverters, commutation and trigger-circuits for forced commutated thyristor inverters. Output voltage control, Harmonics in output voltage waveform, Harmonic attenuation by filters. Harmonic reduction by pulse width modulation techniques, Analysis for single pulse width modulation. Working of current source inverters few applications of inverters.

Advanced topic on the subject

Text Books:

Reference Books:
2. M.S.Berde, Thyristor Engineering, 4th Edition,
Khanna publication, 1986


BEEP310: POWER ELECTRONICS LAB.

List of Practicals:
1. To determine latching and holding current of SCR by using V-I characteristics
2. To plot the V-I characteristics of TRIAC in forward direction and backward direction.
3. To determine intrinsic standoff ratio by using V-I characteristics of UJT
4. To perform UJT as a relaxation oscillator
5. To draw the collector and transconductance characteristics of IGBT
6. To convert DC to AC by using Series Inverter
7. To obtain variable AC from DC by using Parallel Inverter
8. To perform class A commutation of a thyristor
9. To plot the characteristics of DC chopper
10. To convert AC to DC by using single phase converter.
11. To plot drain and transconductance characteristics of MOSFET
12. To find break over voltage through the V-I characteristics of DIAC
13. To perform the AC voltage control by using TRIAC
14. To simulate the three phase inverter by using PSIM software
15. Simulink implementation of a 3-phase, 6-step, voltage source inverter supplying resistive load.

BEEL403 CONTROL SYSTEM –II (3-1-0-4)
Total Hrs: 40

Pre-requisite: - Control System-I (BEEL303)
Co-requisite: -

Course Objectives:
1) To introduce the elementary design aspects of control systems.
2) To study nonlinear systems, digital system.
3) To study optimal operation of control systems.

Course Outcomes:
Upon successful completion of the course, students shall be able to-
1. Mathematically relate the state variables with the physical system.
2. Design controllers/compensators for close loop control.
3. Ability to use appropriate control system analysis method for linear and non linear applications

Unit – I

Unit-II

Unit-III

Unit – IV

Unit-V

Unit-VI

Text Books:

Reference Books:

**BEEP311 Minor project** (0-0-4-2)

**Course Objectives:**
1. To provide opportunity for selection of a project, search related literature.
2. To identify appropriate components with rating.
3. To design, fabricate and test a real time system by working in a group.

**Course Outcomes:**
Upon successful completion of the course, students shall be able to-
1. Search correct literature, select and propose a system, design, fabricate and test to develop conclusions
2. Ability to work in a group of students of socially different backgrounds.
3. Ability to analyse results, make conclusions and deliver by power point presentation before teachers and colleagues.

**ELECTIVE-I**

**BEEL401 : INDUSTRIAL INSTRUMENTATION AND AUTOMATION (3-0-0-3)**

*Total Hrs: 30*

**Pre-requisite:** - Electrical Measurements & Instrumentation (BEEL202)

**Co-requisite:** - Control Systems-I (BEEL303), Electrical Drives & their control(BEEL302)

**Course Objectives:**
1. To introduce the popular processes in Industries and the methods to make the production processes more efficient & economical by automation.
2. To introduce SCADA system components.
3. To introduce transmission & distribution sector operations.

**Course Outcomes:**
Upon successful completion of the course, students shall be able to-
1. Understand SCADA System architecture, components, communication and industrial application.
2. Developed skills to learn various sensor, Transducer, Amplifier, Filters, Data acquisition systems
3. Understand programmable logic controllers used in industrial application

**Unit I** (05 Hrs)
Industrial measurement systems – different types of industrial variables and measurement systems elements – sensors and transducers for different industrial variables like pressure, torque, speed, temperature etc.

**Unit II** (05 Hrs)

**Unit III** (05 Hrs)
Introduction to SCADA: Data acquisition systems, Evolution of SCADA, Communication technologies, Monitoring and supervisory functions, SCADA applications in Utility Automation, Industries

**Unit IV** (05 Hrs)
SCADA System Components: Schemes- Remote Terminal Unit (RTU), Intelligent Electronic Devices (IED), Programmable Logic Controller (PLC), Communication Network, SCADA Server, SCADA/HMI Systems

**Unit V** (05 Hrs)
SCADA Architecture: Various SCADA architectures, advantages and disadvantages of each system - single unified standard architecture - IEC 61850, SCADA Communication various industrial communication technologies - wired and wireless methods and fiber optics. open standard communication protocols

**Unit VI** (05 Hrs)
SCADA Applications: Utility applications - Transmission and Distribution sector - operations, monitoring, analysis and improvement. Industries - oil, gas and water. Case studies, Recent Case studies, Implementation, Simulation Exercises. Advanced topic on the subject

**Text Books:**

**Reference Books:**

**BECL 303: MICROPROCESSOR BASED SYSTEMS [3-0-0-3]**

*Total Hrs: 30*

**Course-Prerequisite:** Basic Electronics (BECL105), Microprocessor Application (BECL 309)
Course Objectives: - To introduce the architecture, interfacing and programming of 8086 and 8088 microprocessor and peripherals for common applications.

Course Outcomes:
1. Acquire extensive knowledge of microprocessor based architecture and its interfacing with peripheral devices.

Modes of Delivery of Courses:

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<th>Conventional Teaching (Chalk Board)</th>
<th>Software simulation</th>
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<td>Assignments and Tutorials</td>
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<td>5</td>
<td>Activity based learning (Quiz, Poster, etc)</td>
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UNIT 1: (05Hrs)
Building Concepts of Microprocessor, Introduction to 16, 32, 64 bit Microprocessor, Comparison of 8086 / 8088 CPU Architecture, Microprocessor Evolution - INTEL 8086 to Pentium with focus on - Clock Speed, Concurrent operation of EU and BIU, Memory Organization, Interfacing addressing modes, Instruction set, Programming examples, Pseudo Opcodes, Assembler Directives.

UNIT 2: (05Hrs)

UNIT 3: (05Hrs)
Architecture, Organization operation & Interfacing of 8259, ICWs, OCWs, and Cascading, Interfacing of 8279 – Keyboard Display Mode, Sensor matrix Mode, 8237 DMA Controllers and Organization, Control Words.

UNIT 4: (05Hrs)
8086 / 88 Maximum Mode, Architecture and Programming of 8087 and its Interfacing with 8086/8088, 80386 Architecture, Real and Protected Mode

UNIT 5: (05Hrs)
8051 Architecture, Pin Diagram, 8051 Assembly Language Programming, PSW, Stack, Internal and External memory, SFR, Counters and Timers, Serial I/O and Interrupt Structure

UNIT 6: (05Hrs)
8051 Instruction Set, Interrupts, Programming exercises for interlaced with keyboard, LED Matrix time delays. Interfacing of LCD, ADC to 8051, Interfacing a Stepper Motor, Recent microprocessor systems. Advanced topic on the subject.

Text Book :
1. Programming & Interfacing of 8086 / 8088, D.V. Hall, TMH.
2. Intel Reference Manuals, Microprocessor & Microcontrollers: Intel
3. Advanced Microprocessor & peripherals. A. K Ray (TMH)

Reference Books :
1. The 8051 Microcontroller and Embedded systems – M. A. Mazidi
2. 8051 Microcontroller – Ayala (TMH).
3. Microprocessors 8086 / 88 Family Prog. Interfacing: Liu, Gibson

BECL 405: DIGITAL SIGNAL PROCESSING [3-0-0-3]
Total Hrs: 30
Pre-requisite: Applied Mathematics-III (BAML202), Control System-I (BEEL303)

Co-requisite: -

Course Objectives:
1. To introduce the mathematical analysis of DSP.
2. To introduce filter design techniques.
3. To study various DSP applications.

Course Outcomes:
Upon successful completion of the course, students shall be able to-
1. Understand the architecture and applications of popular DSPs
2. Develop skills to analyze and process discrete time signals for different kinds of applications
3. Retrieve and interface the information from deterministic and random signals.
4. Design filter using different methods

Unit I (5Hrs)
Discrete time signals and systems, classification of discrete time systems and its properties, Linear convolution, Cross Correlation, Autocorrelation of discrete signals, sampling theorem & sampling process.
Unit II

Unit III
Transform analysis of LTI system & structure for discrete – time system. Frequency response of LTI system, Relationship between magnitude & phase response, Block diagram representation & signal flow graph representation of IIR and FIR systems. Linear constant coefficient difference equations, Basic structures for IIR systems, transposed forms, basic network structures for FIR systems, lattice structures.

Unit IV
Filter design Techniques: Design of discrete time IIR filters from continuous time filters, Frequency transformation of low pass IIR filters, Design of FIR filters by windowing, FIR filter design by Kaiser and Hamming window method.

Unit V

Text Books:

Reference Books:

BEEL402: ELECTRICAL ENERGY MANAGEMENT [3-0-0-3]
Total Hrs: 30
Pre-requisite: - Electrical Machines-I(BEEL204), Electrical Machines-II(BEEL301)
Co-requisite: - Electrical Power System-I(BEEL309)

Course Objectives
1. To introduce the energy efficiency aspects in various electrical appliances and equipments.
2. To introduce types of compressors.
3. To introduce energy efficiency in environmental aspects of energy and pollution control.

Course Outcomes:
Upon successful completion of the course, students shall be able to-
1. Understand the energy efficiency techniques in different applications like compressors, lighting, fans, blowers and pumps.
2. Have knowledge about statutory aspects and legal provisions.
3. Understand energy efficient technologies in electrical system.

Recent software used for energy audit.

Text Books:

Reference Books:

MBL105 General Proficiency –V "Employability Skills & Technical Report Writing"

For syllabus : please refer electronics engg. Departments syllabus in sixth semester

MBL 106 General Proficiency –VI Research Methodology Workshop

For syllabus : please refer electronics engg. Departments syllabus in sixth semester

OPEN ELECTIVES
For syllabus of open elective subjects, please refer syllabus provided in B.E. (Electronics Engineering) programme - Sixth Semester

SEVENTH SEMESTER

BEEP 412: INDUSTRIAL PROJECT (PHASE-I)

Pre-requisite: - Minor project(BEEP 411)

Co-requisite: -

Course Objectives:
1. To expose students to industry environment
2. To get practical orientation relevant to subjects
3. To provide solutions to industrial and social need

Course Outcome:
At the end of the course the student shall be able to:
1. Understand working culture of industry
2. Identify and solve industrial problem with analytical approach
3. Provide consultancy in specific domain

- A group of 04 student (Maximum) should identify an industry of good standing on their own in consultation with guide.
- Students are expected to complete topic identification and synopsis during this project seminar.
- All formalities related to industry Identification, topic identification and synopsis must be completed during 1st month of phase1.
- Period of industrial project will be of 24 week starting from last date of even semester exam every year.
- Student must report to his project guide every month.
- Student will be required to present from time to time (minimum.4 times during project); their progress report for project evaluation in person.. Under exceptional circumstances: the student may be allowed to present through video-conferencing. However this is not applicable to final Seminar
- Evaluation of the project will be according to the sheet attached.

BEEP 415: COMPUTER APPLICATION TO ELECTRICAL ENGINEERING

Pre-requisite: - EPS-I (BEEL309)

Co-requisite:

Course Objectives:
1. To design & analyze electrical system with the help of softwares.
2. To apply different analytical tools to find solution for short circuit and load flow studies.
3. To solve complex engineering problems using computers

Course Outcome:
At the end of the course the student shall be able to:
1. Apply numerical methods for power system studies.
2. Prepare transmission line information in bus admittance or bus impedance form that can be further used for load flow analysis, short circuit studies and transient stability studies.
3. Develop and test computer program for transient stability & load flow analysis using different iterative methods

List of Practicals:
1. Program to find $A^\times$ and $A$ for a given system.
2. Program to plot swing curve of a given system by step by step method.
3. Program for transient stability by modified Euler’s method.
4. Program to obtain load flow analysis using ETAP software.
5. Study of simple transmission system using PSCAD software.
6. To perform Load flow analysis of IEEE 30 bus system by using Gauss sidle method.
7. To perform Load flow analysis of IEEE 30 bus system by using Newton Raphson method.
8. To perform load flow analysis by fast decoupled method.
9. Program to find Z bus of a power system network.
10. Program to find Y bus of a power system network.
11. Program to find Symmetrical fault through a fault impedance Zf=j0.1 per unit.
12. Program to find unsymmetrical fault through a fault impedance Zf=j0.1 per unit.
13. To do the load flow analysis using Power World Simulator software.
14. To write the program to calculate the network matrices in MATLAB by using singular transformation.
15. Program to find contingency analysis of given power system.

EIGHT SEMESTER

BEEL404 ELECTRICAL POWER SYSTEM - II (3-1-0-4)

Total Hrs: 40

Objectives:
1. To introduce the techniques to control the system voltage, voltage regulation, real and reactive power, power quality, efficiency, practical stability limits during healthy and faulty conditions.
2. To make students familiar with energy management
3. To study environmental issues associated with transmission grids/power system

Outcomes:
1. Analyze the power system under different type of fault conditions
2. Determine the stability condition of Power System
3. Simulate the power system on computer for short-circuit and transient analysis using standard software

UNIT 1: Incidence & Network Matrices: (06 )
Graph incidence Matrices, Primitive network, formation of network matrices by Singular transformations. Algorithm for formation of Bus Impedance and Bus Admittance matrix for system without mutual coupling.

UNIT 2:
Symmetrical fault Analysis

UNIT 3:
Symmetrical Component transformation: Three phase power in unbalanced circuit in terms of symmetrical component. Sequence impedances of Generator, Transformer, Transmission line & Passive loads. Phase shift in Star / delta three phase transformer (Yd I, Ydll connection.)


UNIT 4:

UNIT 5:

UNIT 6:

Text Books:
1. Elements of P.S. Analysis- Stevenson
2. Modern power System analysis - Nagrah&Kothari
3. Power System Analysis - Wadhwa C.L.
5. Power system analysis by Grainger and William D. Stevenson.

Reference Books:
4. LIST OF SOFTWARE: -PSAT & MATPOWER TOOL BOX
BEEP404: ELECTRICAL POWER SYSTEM-II LAB.

List of Practical:
1. Overview of lab equipment and safety precautions
2. Ferranti effect on transmission line panel
3. The effect of shunt compensation on transmission line performance using transmission line simulator
4. Simulation of power system for transient stability analysis by MATLAB
5. ABCD parameters of the transmission line
6. The Symmetrical and Unsymmetrical fault analysis using PSCAD Software
7. Load Flow Analysis of Balanced and Unbalanced 3-phase power System using ETAP.
8. The performance of transmission line using PLC.
9. The PLC operation for voltage regulation of long transmission line
10. To Plot Characteristics of UPFC
11. The various types of SVC using single phase power line analyzer
12. To plot the characteristics of TSSC
13. Open Ended Experiment

ELECTIVE –II
BEEL 409 OPTIMIZATION TECHNIQUES   (3-0-03)
Total Hrs: 30

Pre-requisite: -
Co-requisite: -

Course Objectives
1. This course aims at introducing the optimization techniques and their applications required to monitor complex engineering systems with the help of fast computing tools.
2. To introduce Non-linear programming.
3. To introduce Dynamic programming.

Course Outcomes
Upon successful completion of the course, students shall be able to:
1. Apply the optimization algorithm to solve engineering science problems such as minimization of unconstrained functions of several variables, steepest descent, Newton/Raphson, conjugate gradient, and quasi-Newton methods. Rates of convergence, methods for constrained minimization.
2. Introduction to linear programming, gradient projection methods and Lagrangian methods.
3. Understand to evolutionary computer technique.

Unit I   (05 Hrs)

Unit II   (05 Hrs)
Multi-variable optimization with equality constraints. Lagrange multiplier method, Multi-Variable optimization with inequality constraints, Kuhn-Tucker conditions.

Unit III   (05 Hrs)
Linear Programming: Standard form, formulation of the LPP, Solution of simultaneous equations by pivotal condensation, Graphical methods, Simplex algorithm, Big M Method, Two phase Simplex method, Duality principle, Dual Simplex method

Unit IV   (05 Hrs)
Introduction to Non-linear Programming: Gradient Method: Steepest Descent, conjugate Gradient and Quasi-Newton method

Unit V   (05 Hrs)
Dynamic Programming: Multistage design process, Types, Principle of optimality, Computational procedure in Dynamic programming, Examples using Calculus method and Tabular method of solutions, Recent software for optimization techniques. Advanced topic on the subject

Unit VI   (05 Hrs)
Introduction to evolutionary computer techniques: Genetic algorithm, crossover mutation, sorting

Text Books:

Reference Books:

BEEL410 ELECTRICAL INSTALLATION & DESIGN (3-0-0-3)
(E-II)      Total Hrs: 30

Pre-requisite: -
Co-requisite: -

Course Objectives
1. The course deals with planning, estimation & installation of electrical systems for large residential, commercial buildings & for large factories.
2. To introduce load forecasting.
3 To introduce determination of fault level of various locations in substation.

Course Outcome:
At the end of the course the student shall be able to:

1. Understand the basic procedures for planning, estimation & installation of electrical systems for large residential buildings.
2. Understand the basic procedures for planning, estimation & installation of electrical systems for large factories.
3. Understand the basic procedures for planning, estimation & installation of electrical systems for commercial buildings.

4. **Unit I** (05 Hrs) Load forecasting, regression analysis numerical based on linear and exponential trends. Electrical installation for domestic commercial and industrial consumers, calculation of connected load, selection of transformers, switchgear cables and wires, single line diagram, special provision for high rise buildings (IER-50-A), earthing requirement, muggert and earth tests use of earth leakage circuit breakers (special reference to be given to IER 2)

**Unit II** (05Hrs)
Cables – PVC and XLPE cables their construction in brief, current ratings, specification Dreading factors muggert and continuity test. Over head distribution lines upto 33KV, line apparatus and basic construction in brief clearance selection of AAC and ACSR conductors, voltage drop calculation. Selection of Insulators, earthing types. Measurement of earth resistance.

**Unit III** (05Hrs)
Illumination design definitions, polar curves, simple calculations, working principles of fluorescent, sodium vapor and mercury vapor lamps. Capacitors and P.F. improvement – determination of rating and location of capacitors, calculation of payback period for additional capacitors.

**Unit IV** (05 Hrs)
Substation Single line diagram plan, 1elevation, and clearances for 11 KV pole mounted, 11 KV plinth mounted (upto 1000 KVA and above 1000 KVA), 33 KV (upto 2500 KV A & above 2500 KV A) Substations. Single line diagram for substation with two transformer in parallel, Specifications of isolators, lightening arrestors, horn gap fuses, D.O. fuses, circuit breakers instrument transformers power transformer various bus bar systems, load transfer. (Special reference to be given IER).

(31,33,35,43,44,45A4,50,51,54,55,58,64A,67,IS3043).

**Unit V** (05 Hrs) Determination of fault level of various locations in substation, use of current limiting reactors. Philosophy of protective relaying, over current, earth fault, REF protection, earth leakage protection, OTI WTI, Buchholz relays. Fire lighting equipment, restoration of a person affected by electric shock. Earthing types. Measurement of earth resistance.

**Unit VI** (05 Hrs)
Sire testing of transformer (Visual, precommissioning tests like muggert magnetic balance term ratio) testing of oil, operational test for Buchholz OTI, WTI, alarm and trip functions, Recent software for electrical installation & design.

Advanced topic on the subject

Text Books:

Reference Books:

BEEL411 EHV-AC& HVDC TRANSMISSION (3-0-0-3) (E-II) Total Hrs: 30

Pre-requisite: -
Co-requisite: -

Course Objectives
1. To introduce generation of fields by extra high voltages, transmission line.
2. To introduce effect of fields on human being, plants.
3. Study of HVDC control techniques, advantages and protection of EHVAC & HVDC transmission.

Course Outcome:
At the end of the course the student shall be able to:
1. Understand the effect of electrostatic and electromagnetic field on EHVAC lines.
2. Understand Comparison between AC and DC Transmission.
3. Understand Control of power in HVDC lines, filters, circuit breakers and HVDC substations.

**Unit I** (05 Hrs)
Power handing capacities of EHV AC Transmission lines. Voltage gradients : Electric field of point charge. sphere gap- line charge, single and three phase lines and bounded conductors- Maxwell’s potential co- efficiencies, Mangoleit Formula
Unit II (05 Hrs)
Electrostatic and electromagnetic fields of EHV Lines, Electric shock and threshold current : Capacitance of long object , calculation of electromagnetic field of A.C. Lines (3-ph Single and double circuit line only) Effect of high electrostatics field , measurement of electrostatic ground wires, electrostatic interference Corona : Types critical disruptive voltages : Factor affecting corona , Methods for reducing corona power loss, corona current wave form charge voltage diagram audible noise and ratio interference

Unit III (05 Hrs)
Comparison of EHV AC and HVDC Systems:Conversion from AC to DC Rectifiers, converters conversion from AC to DC Invertors Kinds of DC Link.Earth electrode and earth returns : Introduction OBJECTIVE, location and configuration, resistance of electrodes means of reducing earth electrode resistance troubles caused by earth electrode resistance trouble caused by earth current and remedies.Multiterminal HVDC System : Introduction 2 pole transmission. MTDC System with series and parallel connected convertors advantages and parallel connected convertors, advantages and applications configurations and types

Unit IV (05 Hrs)
Power flow control in HVDC System : constant current constant voltage, constant ignition and extinction angle control, control characteristics. Parallel operation of AC and DC links (Synchronous and Asynchronous links)

Unit V (05 Hrs)
Harmonic Filters: Introduction Filters, Surge capacitors and Damping circuits shunt filters series Filters. AC filters, design of A. C. filters and tuned filters, double frequency and damped filters, cost considerations, Rating harmonics on D.C side of convertors. D. C. Harmonic filters. (ii) Reactive power compensation : Reactive power requirements of HVDC convertors, substations, effect of delay angle and extinction angle on reactive power.

Unit VI (05 Hrs)
(i) HVDC circuit breakers: Introduction, construction, Principle, switching energy. Interruption of D. C. current, application of MRTB, Types of HVDC C. B, capability and characteristics of HVDC circuit breakers. (ii) HVDC substation protection against short-circuits: Introduction, fault, clearing, protective, zones, protection, symbols, HVDC line pole protections (fault clearing and re-energizing. (iii) HVDC substation Protection against over-voltages Difference between insulation coordination of AC and DC systems. Fundamentals of switching over-voltages, D. V. on A. C. sides and on D.C. side, surge-arresters protection scheme, insulation coordination and protection margin, Advances in HVDC transmission. Advanced topic on the subject

Text Books:

Reference Books:

BEEL501 ADVANCED POWER SYSTEM STABILITY (3-0-0-3)
(E-II)
Total Hrs: 30

Pre-requisite: -
Co-requisite: -

Course Objectives
1. To introduce fault analysis of large power system
2. To study methods of symmetrical components.
3. To study effects of grounding on stability.

Course Outcomes
Upon successful completion of the course, students shall be able to-
1. Understand the advanced methods of ensuring power system stability during fault conditions and major disturbances.
2. Understand the behavior of rotor in synchronous generators, the effect of change in load on rotor angular velocity and acceleration.

Unit I (05 Hrs)
Fault analysis of large power system, Calculation of three phase balanced and unbalanced faults.

Unit II (05 Hrs)
Methods of Symmetrical components. Fault levels in a typical system. Power in symmetrical components.

Unit III (05 Hrs)

Unit IV (05 Hrs)
Effects of grounding on stability, effects of various disturbance, parameters and controls on stability, prevention of stability pull out.

Unit V (05 Hrs)
Role of automatic voltage regulator (AVR) on improving stability.

Unit VI (05 Hrs)

Advanced topic on the subject

Text Books:

Reference Books:

MBAL101 ENTREPRENEURSHIP DEVELOPMENT (3-0-0-3) (E-II)
Total Hrs: 30
Pre-requisite: -
Co-requisite: -

Course Objectives
1. All round development has opened large number of avenues for ambitious young people to prosper on their own. Entrepreneurship needs a happy blend of technical abilities & managerial skills.
2. To introduce International Entrepreneurship Opportunities.

Course Outcomes
Upon successful completion of the course, students shall be able to-
1. Identify the skills and knowledge to become prospective entrepreneurs
2. Prepare business plans and its feasibility report
3. Understand various institutions for financial assistance.

Unit I (5Hrs)
Entrepreneur: Meaning of Entrepreneur; Evolution of the Concept; Functions of an Entrepreneur, Types of entrepreneur, Intrapreneur – an emerging class, Concept of Entrepreneurship-Evolution of Entrepreneurship; Development of Entrepreneurship; The entrepreneurial Culture; Stages in entrepreneurial process.

Unit II (5Hrs)

Unit III (5Hrs)
Business Planning Process Meaning of business plan, Business plan process, Advantages of business plan, Marketing plan, Production/operations plan, Organizational plan, financial plan, Final project report with feasibility study, preparing a model project report for starting a new venture.

Unit IV (5Hrs)
Institutions supporting entrepreneurs Small industry financing developing countries, A brief overview of financial institutions in India, Central level and state level institutions, SIDBI, NABARD, IDBI, SIFO, Indian Institute of Entrepreneurship, DIC, Single window, Latest Industrial policy of Government of India

Unit V (5Hrs)

Unit VI (5Hrs)
International Entrepreneurship Opportunities: The nature of international entrepreneurship, Importance of international business to the firm, International versus domestic entrepreneurship, Stages of economic development, Entrepreneurship entry into international business, exporting, Direct foreign investment, barriers to international trade.

Advanced topic on the subject

Text Books:

Reference Books:

1.
BEEL406 SWITCH GEAR & PROTECTION
(3-1-0-4)
Total Hrs: 40
Pre-requisite: - EPS-I (BEEL309)

Co-requisite: -

Course Objectives
1. To introduce the construction, working and applications of different relays & protective schemes like distance protection, differential, over current & overvoltage protection.
2. To study different types of circuit breaker used and practical application.
3. Introduction to static and numerical relays.

Course Outcomes
Upon successful completion of the course, students shall be able to:
1. Understand the construction, working and characteristics of different types of relays and circuit breakers.
2. Understand the schemes of protection for medium voltage line, high voltage line and equipments.
3. Understand static and numerical relays.

Unit I (6 Hrs)
General philosophy of Protective Relaying: Protective zones, primary protection, Back up protection Remote and Local Back up selectivity.

Unit II (7 Hrs)
Medium voltage Line Protection: Over current relaying, directional over current relay.

Unit III (7 Hrs)
High Voltage Line Protection: Distance relays, carrier distance schemes. Unit carrier schemes.

Unit IV (8 Hrs)

Unit V (6 Hrs)
Introduction to static and numerical relays : Comparison of static and electro mechanical relays, two input amplitude and phase comparator and their duality. Generation of various distance relay characteristics using above comparators.

Unit VI (6 Hrs)
Switchgear: Circuit breakers. Arc interruption theory, recovery and restricting voltages, RRRV, breaking of inductive and capacitive currents, C.B, ratings, different media of arc interruption, overview of oil circuit breakers, construction and operation of Air blast, SF6 and vacuum breakers, Advances in industrial power system protection. Advanced topic on the subject

Text Books:

Reference Books:

BEEP406 : SWITCH GEAR & PROTECTION LAB
List of Practical:
1. To determine PSM and plot the characteristic of Definite Time over current Relay.
2. To analyze and plot the characteristic of Single Pole Static I.D.M.T. Over Current relay during earth fault.
3. To determine the pickup value and plot the characteristic of Electromagnetic IDMT Relay.
4. To plot the characteristic of Static Definite Time Reverse Power Relay.
5. To plot the characteristic of Static Definite Time Reverse Power Relay.
6. To Plot The Characteristics of Fuse Wire
7. To plot the characteristics of Directional over Current Relay.
8. To analyze the Operation of Impedance Relay (Model-ABB-RAKZB)
9. To analyze and plot Percentage Differential Protection Scheme.
10. To plot the characteristic of Static over voltage Relay(Model-ASOV)
11. To analyze the effect of Reverse Restricting Recovery Voltage using MATLAB Software.
12. To analyze and plot the Operation of Unrestricted Earth Fault Relays.
13. To plot the Characteristic of Microprocessor Based Relay.
15. To simulate Fault in electrical power system using MATLAB Software.
16. Open Ended Experiments
Course Objective:
1. To provide opportunity for working on a real-time project, prepare a prototype and present conclusions in the form of reports.
2. To provide opportunity for selection of projects considering their usability to the industry and society without endangering the environmental aspects.

Course Outcomes:
Upon successful completion of the course, students shall be able to:
1. Provide hands-on experience on real-time systems
2. Boost confidence
3. Ability to work in a multidisciplinary group.
4. Ability to consider the industry, social and environmental requirement
5. Present conclusions effectively before the audience

BEEL414: POWER SEMICONDUCTOR BASED DRIVES (4-1-0-5)
Total Hrs: 50
Pre-requisite: - Electrical drives and their control. 
Power Electronics, Machine-I, Machine-II
Co-requisite: -
Course Objectives:
1. To introduce the practical aspects of electric drives, 
2. To study conventional and advanced control methodologies and performance parameters. 
3. To introduce traction drives.

Course Outcomes:
Upon successful completion of the course, students shall be able to:
1. Develop a comprehensive knowledge of converters, inverters and chopper used for speed variations in drive system in industries and traction. 
2. Understand the use of power semiconductor based controllers in process/municipal industries. 
3. Understand dynamics of electrical drives.

Unit I (08 Hrs)
Dynamics of electric drives and control of electric drives, energy conservations in electric drives.

Unit II (09 Hrs)
Dynamics of Electrical Drives

Classification of electric drives – Basic elements of an electric drive. Dynamic condition of electric System. Stability consideration of electric drives., Analysis of electric machinery.

Unit II

(05 Hrs)

Unit III

(05 Hrs)

Unit IV

(05 Hrs)
Synchronous servomotor drives with sinusoidal waveform, with sinusoidal waveforms, with trapezoidal waveforms, Load commutated inverter drives.

Unit V

(05 Hrs)
Control of AC / DC machines. State variable approach. Scalar control method / Vector control method, comparison, Space vectors, stator space current, stator voltage space vector, stator flux linkages space vector, transformation of space vector coordinates from one reference frame to another.

Unit VI

(05 Hrs)

Text Books:

Reference Books:

BEEL503 ELECTRIC VEHICLES (3-0-0-3) Total Hrs: 30

Course Objectives

1. Electrical Vehicles need strong sources, efficient power-drives & excellent co-ordination within the vehicle.
2. This course introduces modern subsystems for efficient operation of vehicles.

Course Outcome

Upon successful completion of the course, students shall be able to-
1. Learn pollution problems due to petrol or diesel driven vehicles and suggest the remedial measures by developing skills to use sensors, motors, batteries.
2. Understand ultra-capacitors and hybrid system for electric vehicles in cost effective way.
3. Understand fuel cell vehicle.

Unit I

(05 Hrs)
Electric vehicles (EV) development, past, present and future, comparison with IC engine driven vehicles.

Unit II

(05 Hrs)
Batteries, fuel cells, ultracapacitors. Power converters in EV. Different types of motors used in EV and their torque-speed characteristics, motor control techniques.

Unit III

(05 Hrs)
High performance and efficiency-optimized control, sensorless control. EV modeling, Their Characteristics.

Unit IV

(05 Hrs)
Slip phenomena. Road condition estimation, driving force observer.

Unit V

(05 Hrs)
EV motion control, optimum slip ratio control, movement control, lateral motion stabilization.

Unit VI

(05 Hrs)
Fuel cell Vehicles, Hybrid Electric Vehicles (HEV), series, parallel and series-parallel (split) systems, Recent industrial power electronic applications. Advanced topic on the subject.

Text Books:

Reference Books:
2. Springer Books, Electrical Vehicle Integration into Modern Power Networks
BEEL504: ADVANCED POWER ELECTRONICS (3-0-0-3)  
Total Hrs: 30

Course Objectives
1. This subject deals with the modern power semiconductor switches, converters, their control and application in residential, commercial & industrial etc
2. To study DC to DC switch mode converter.
3. To introduce resonant converter

Course Outcomes
Upon successful completion of the course, students shall be able to-
1. Understand harmonic reduction techniques,
2. Understand advanced power electronic controllers, dc to dc converter, resonant converter and their applications.
3. Understand various electric utility application.

Unit I  (5 Hrs)
Over view of power semiconductor device structure, characteristics , rating and protection (Thyristor, BJT, MOSFET, IGBT, MOS controlled Thyristor etc.) comparison of controlled switches.

Unit II  (5 Hrs)

Unit III  (5 Hrs)
Inverters, type (Hard/soft switch inverter, Voltage source inverter current source inverter). Operation with different types of loads, Performance parameters Harmonic elimination, control of output voltage using different switching techniques.

Unit IV  (5 Hrs)
DC to DC switch mode converters, Basic concepts, analysis of switch on and Off transients types, DC to DC converters comparison, soft switching, close loop control.

Unit V  (5 Hrs)
Resonant converters, comparison of PWM and resonant converters, classification, Basic resonant circuit concepts, Analysis and design of SRC (series), PRC (parallel), SPRC (series-parallel) resonant converters, DC-DC as well as AC-DC resonant converter, application for induction heating and reduction in THD and P.F. improvement.

Unit VI  (5 Hrs)
Different methods to control the output voltage.

BEEL505 MODERN CONTROL SYSTEMS  (3-0-0-3)  
Total Hrs: 30

Course Objectives
1. Recent analytical tools enable us to monitor an engineering system in a fast manner ensuring system stability. The same aspects are highlighted in this course.
2. To introduce optimal control.
3. To introduce state variable analysis.

Course Outcomes:
Upon successful completion of the course, students shall be able to:
1. Understand and apply advanced optimal techniques to given system
2. Develop close-loop observer
3. Understand the concept of pole-placement

Unit I  (05 Hrs)

Unit II  (05 Hrs)

Unit III  (05 Hrs)
Stability improvement by state feedback pole placement design and observers. Phase plane analysis isoclines method, delta method.

Unit IV  (05 Hrs)

Electric utility application, various types of SVCs (static var compensator), Power conditioners and uninterruptible power supplies, protection of supply, Introduction to recent intelligent controllers.

Text Books:

Reference Books:

**Unit V** *(05 Hrs)*
Optimal Control, parameters optimization techniques, Lagrange parameter techniques, Calculus of variation, unconstrained and constrained minimization of functional.

**Unit VI** *(05 Hrs)*

Advanced topic on the subject

**Text Books:**

**Reference Books:**

**BEEL506 FUZZY AND NEURAL APPLICATIONS (3-0-0-3)**
Total Hrs: 30

**Course Objectives**
1. To introduce fast computing method to enable us to design economical & reliable control systems based on fuzzy logic & ANN. The same are introduced in this course.
2. To introduce neural applications to electrical systems

**Course Outcomes**
Upon successful completion of the course, students shall be able to-
1. Develop in students the skills to gain a basic understanding of neural network theory and fuzzy logic theory
2. Explore the functional components of neural network classifiers or controllers, and the functional components of fuzzy logic classifiers or controllers
3. Develop and implement a basic trainable neural network or a fuzzy logic system for a typical control, computing application

**Unit I** *(5 Hrs)*
Neural Networks Different Architectures, Back-propagation Algorithm, Hybrid Learning Rule, Supervised Learning- Perceptrons, Adaline, Back-propagation Multilayer Perceptrons, Radial Basis function Networks.

**Unit II** *(5 Hrs)*

**Unit III** *(5 Hrs)*
Neural network applications to electrical systems.

**Unit IV** *(5 Hrs)*

**Unit V** *(5 Hrs)*

**Unit VI** *(5 Hrs)*
Fuzzy Logic in Control Engineering- Mamdani and Sugeno Architecture for Fuzzy Control, Analytical Issues in Fuzzy Logic Control, Applications of Fuzzy Logic to electrical systems.

Advanced topic on the subject

**Text Books:**

**Reference Books:**

**ELECTIVE –III (Eight sem)**
**BEEL405 : FLEXIBLE AC TRANSMISSION SYSTEMS (3-1-0-4)**
Total Hrs: 40
Pre-requisite: -
Co-requisite: -

**Course Objectives:**
1. To introduce different methods for enhancing the flexibility, loading capability.
2. To introduce reliability of power system and its stability margin by using power electronics devices.
3. To study various FACTS devices like TCR, TCS, SSSC, TCSC, STATCOM, UPFC and IPFC

Course Outcome:
At the end of the course the student shall be able to:
1. Understand the operation FACTS devices like TCR, TSC, SSSC, TCSC, STATCOM, UPFC and IPFC.
2. Understand shunt and series compensation using different types of FACTS devices.
3. Understand application of FACTS devices and their combinations to transmission systems

Unit I (07 Hrs)
FACTS Concept and General System Consideration:

Unit II (07 Hrs)

Unit III (06 Hrs)
Static Shunt Compensators: SVC and STATCOM:
OBJECTIVEs of shunt Compensation, Methods of Controllable Var Generation, Static Var Compensators SVC and STATCOM, Comparison Between STATCOM and SVC, Static Var System.

Unit-IV (07 Hrs)
Static Series Compensators: GCSC, TSSC, TCSC and SSSC:
OBJECTIVEs of series Compensation, Variable Impedance Type Series Compensators, Switching Converter Type Series Compensators, External (System) Control for Series Reactive Compensators.

Unit V (07 Hrs)
Static Voltage and Phase Angle Regulators ; TCVR and TCPAR:
OBJECTIVEs of Voltage and Phase Angle regulators, Approaches to Thyristor Controlled Voltage and Phase Angle Regulators (TCVR and TCP ARS), Switching Converter-Based Voltage and Phase Angle regulator, Hybrid Phase Angle Regulators.

Unit VI (06 Hrs)
Combine Compensators (UPFC, IPFC) and Special Purpose FACTS Controllers :
The Unified Power Flow Controller (UPFC), Interline Power Flow Controllers Generalized and Multifunctional FACTS Controllers, Sub synchronous Resonance, NGH-SSR Damping Scheme, Thyristor-Controlled Braking Resistor (TCBR), Recent trends in low rating & distributed FACTS devices.

Advanced topic on the subject

Text Books:

Reference Books:
# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

## SCHEME OF B.E.

### COMPUTER SCIENCE & ENGINEERING

*TAE will be based on Home Assignment, Seminar, Quiz, Surprise Test, Group Discussion, Debate, General Behavior, Attentiveness and Attendance*

### SEMESTER-III

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### SEMESTER-IV

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**ELECTIVE I:**
- BIT L301 - Java Programming
- BCSL312 - Computer Graphics And Visualisation
- BITL408 - Distributed Databases & Object
- BCSL414 - Data Mining & Warehousing Oriented Databases

**SEMESTER-VI**

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**OPEN ELECTIVES:**

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**SEMESTER-VII**

**ELECTIVE II :**
- BECL413 - Wireless Communication
- BCSL403 - Artificial Intelligence & Expert Systems
- BECL423 - Pattern Recognition
- BCSL407 - Advanced Computer Architecture
- BECL405 - Digital Signal Processing

**ELECTIVE III :**
- BCSL416 - Machine Learning
- BCSL410 - Soft Computing
- BECL428 - Wireless Sensor Network
- BCSL412 - Software Architecture
- BITL307 - Scripting Languages

**ELECTIVE IV :**
- BECL425 - Real Time Operating System
- BECL409 - Digital Image Processing
- BITL407 - Advanced Web Technologies
- BITL410 - Software Testing
- BCSL310 - Mobile Computing

**ELECTIVE-V :**
- BITL309 - CYBER LAWS
- BCSL311 - E-COMMERCE
- BITL411 - ENTERPRISE RESOURCE PLANNING
- BCSL415 - CLOUD COMPUTING
- BCSL417 - BIO INFORMATICS
SEMESTER-VIII

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THIRD SEMESTER

BAML204: APPLIED MATHEMATICS – III [3-1-0-4]

Total Hrs: 45

Pre-requisite: MATHEMATICS-I, MATHEMATICS-II

Co-requisite: NA

Course Objectives:
1. This course introduces a general mathematical concepts and objects.
2. It skill the students to understand important mathematical models used in computer science branch.
3. This course also aim to formulate and solve the problems in daily applications of computer science.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand the basics of mathematical concepts
2. Identify the mathematical models and its applications in computer science.
3. Solve the problems in daily applications of computer science.

Unit I: Laplace Transforms (7 Hrs)

Unit II: Z-Transforms (8 Hrs)
The Z transform- definition & properties, inverse & relation with Laplace Transform, Application to z-transform to solve difference equations with constant coefficients.

Unit III: Fourier Series (7 Hrs)
Periodic function & their Fourier expansion, even & odd function, change of interval, half range expansion, Fourier Transforms: Fourier Integral theorem, Fourier transforms and their simple properties

Unit IV: Partial Differential Equations and its application (8 Hrs)
Partial differential equations of first order & first degree (i.e. Lagrange’s form), linear homogeneous partial differential equation of nth order with constant coefficients, method of separation of variable. Simple applications.

Unit V: Random Variables (7 Hrs)
Random Variables, Distribution functions of continuous & discrete random variables, Joint distributions, mathematical expectations, moment, Moment generating function & characteristic function.

Unit VI: Special probability distribution (8Hrs)

Text books:

References
7. Chandrika Prasad, ‘Mathematics for Engineer’, S Chand Publication
**BCSL201 DATA STRUCTURES USING C**

**Pre-requisite:**  Basics of Computing  
**Co-requisite:**  NA  
**Course Objectives:**  
1. This course introduces basic idea of data structure while making aware of methods and structure used to organize large amount of data.  
2. It also aimed at developing skills to implement methods to solve specific problems using basic data structures.  
3. The course also provides career opportunities in design of data, implementation of data, technique to sort and searching the data.  

**Course Outcomes:**  
Upon successful completion of the course, students will be able to  
1. Understand the Basics of structure of data  
2. Identify the structure and implementation of structures handling large amount of data.  
3. Develop an appropriate structure for data structure problems and analyze them for certain applications.  
4. Understand advanced techniques for sorting and searching data efficiently.  

**Unit I: Arrays, Records and Pointers (7 Hrs)**  
Introduction, Linear Arrays, Arrays as ADT, Representation of Linear in Memory, Traversing Linear Arrays, Inserting and deleting, Searching, Linear Search, Binary Search, Multidimensional Arrays, Representation of Polynomials Using Arrays, Pointers, Dynamic Memory Management, Records, Record Structures, Representation of Records in Memory, Parallel Arrays, Matrices, Sparse Matrices.  

**Unit II: Linked List (9 Hrs)**  

**Unit III: Stacks, Queue and Recursion (9 Hrs)**  
Introduction, Stacks, Array Representation of Stacks, Linked Representation of Stacks, Stack as ADT, Arithmetic Expression, Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of Recursive Procedures by Stacks, Queue, Linked Representation of Queues, Queues as ADT, Circular of Queues, Deques, Priority Queues, Applications of Queues.  

**Unit IV: Trees (10 Hrs)**  

**Unit V: Graphs and their Applications (6 Hrs)**  
Introduction, Graph Theory Terminology, Sequential Representation of Graphs, Adjacency Matrix, Path Matrix, Warshall’s Algorithm, Shortest Paths, Linked Representation of a Graph, Operations on Graphs, Traversing a Graph, Posets, Topological Sorting, Spanning Trees.  

**Unit VI: Sorting and Searching (4 Hrs)**  
Introduction, Sorting, Insertion Sort, Selection Sort, Merging, Merge-Sort, Shell Sort, Radix Sort, Searching and Data Modification, Hashing, Advanced topic on Data Structure.  

**Text Books:**  

**Reference Books:**  
1. S. Sahani, ‘Data Structures in C’  

**BCSP201 DATA STRUCTURES USING C**

**Pre-requisite:**  Basics of Computing  
**Co-requisite:**  NA  
**Course Objectives:**  
1. This course introduces basic idea of data structure while making aware of methods and structure used to organize large amount of data.  
2. It also aimed at developing skills to implement methods to solve specific problems using basic data structures.  
3. The course also provides career opportunities in design of data, implementation of data, technique to sort and searching the data.  

**Course Outcomes:**  
Upon successful completion of the course, students will be able to  
1. Understand the Basics of structure of data  
2. Identify the structure and implementation of structures handling large amount of data.  
3. Develop an appropriate structure for data structure problems and analyze them for certain applications.  
4. Understand advanced techniques for sorting and searching data efficiently.  

**Unit I: Arrays, Records and Pointers (7 Hrs)**  
Introduction, Linear Arrays, Arrays as ADT, Representation of Linear in Memory, Traversing Linear Arrays, Inserting and deleting, Sorting; Bubble Sort, Searching; Linear Search, Binary Search, Multidimensional Arrays, Representation of Polynomials Using Arrays, Pointers; Pointer Arrays, Dynamic Memory Management, Records; Record Structures, Representation of Records in Memory; Parallel Arrays, Matrices, Sparse Matrices.  

**Unit II: Linked List (9 Hrs)**  

**Unit III: Stacks, Queue and Recursion (9 Hrs)**  
Introduction, Stacks, Array Representation of Stacks, Linked Representation of Stacks, Stack as ADT, Arithmetic Expression; Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of Recursive Procedures by Stacks, Queue, Linked Representation of Queues, Queues as ADT, Circular of Queues, Deques, Priority Queues, Applications of Queues.  

**Unit IV: Trees (10 Hrs)**  

**Unit V: Graphs and their Applications (6 Hrs)**  
Introduction, Graph Theory Terminology, Sequential Representation of Graphs, Adjacency Matrix, Path Matrix, Warshall’s Algorithm, Shortest Paths, Linked Representation of a Graph, Operations on Graphs, Traversing a Graph, Posets, Topological Sorting, Spanning Trees.  

**Unit VI: Sorting and Searching (4 Hrs)**  
Introduction, Sorting, Insertion Sort, Selection Sort, Merging, Merge-Sort, Shell Sort, Radix Sort, Searching and Data Modification, Hashing, Advanced topic on Data Structure.  

**Text Books:**  

**Reference Books:**  
1. S. Sahani, ‘Data Structures in C’  

**List of practical:**  
1. Write and execute a program in C to implement stack using arrays.  
2. Write and execute a program in C to implement queue using arrays.  
3. Write and execute a program in C to implement simple linked list.  
4. Write and execute a program in C to implement stack using linked list.  
5. Write and execute a program in C to implement queue using linked list.  
6. Write and execute a program in C to implement doubly linked list.  
7. Write and execute a program in C to implement circular linked list.  
8. Write and execute a program in C to reverse a singly and doubly linked list.  
9. Write and execute a program in C to insert a node in a linked list in a sorted fashion.  

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10. Write and execute a program in C to implement binary tree, finding the depth of a tree
11. Write and execute a program in C to implement inorder, preorder and postorder traversals
12. Write and execute a program in C to find if two trees are identical
13. Write and execute a program in C to implement graph using linked list
14. Write and execute a program in C to implement bubble sort and selection sort using menu driven program
15. Write and execute a program in C to implement merge sort
16. Open ended practical

BECL303: MICROPROCESSOR BASED SYSTEMS (3-1-0-4)
Total Hrs: 45 hours

Pre-requisite: Basics of Electronics
Co-requisite: NA

Course Objectives:
1. This course introduces a general idea and basic digital circuits used for designing a microprocessor.
2. It is aimed at developing skills to develop assembly language programming.
3. They learn making interfacing with peripheral devices.
4. The course provides career opportunities in the subject areas of design and programming of microprocessors.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand the architecture and instruction set of microprocessor.
2. Develop Assembly Language programs used in microprocessor for its operations.
3. Understand different peripheral devices and their interfacing to microprocessor.
4. Understand advanced microprocessor architecture and its programming

Unit I: Introduction to 8086 Microprocessor (7 Hrs)
Building Concepts of Microprocessor, Introduction to 16, 32, 64 bit Microprocessor, Comparison of 8086 / 8088 CPU Architecture, Microprocessor Evolution - INTEL 8086 to Pentium with focus on Clock Speed, Concurrent operation of EU and BIU, Memory Organization & Interfacing.

Unit II: 8086 Programming (8 Hrs)
Addressing modes, Instruction set, Programming examples, Pseudo Opcodes, Assembler Directives.
10. Open Ended experiments on Microprocessor Interfacing

BCSL202 COMPUTER ARCHITECTURE & ORGANIZATION  
(4-0-0-4)  
Total Hrs: 45

Pre-requisite: Basics of Electronics  
Co-requisite: NA

Course Objectives:
1. This course introduces basic fundamental Units of a computer system and its operation and flow of information between these Units.
2. It is aimed at developing skills to implement control Unit performing operations such as Addition, Subtraction, Multiplication and Division.
3. The course provides career opportunities in the subject areas of designing an advanced computer system.

Course Outcomes:  
Upon successful completion of the course, students will be able to
1. Understand the basic structure and operation of a digital computer.
2. Understand Arithmetic operations of fixed and floating point addition, subtraction, multiplication and Division.
3. Understand different types of control and concept of pipelining.
4. Understand organization and design of memory .Concept, structure and operation of Cache memory and virtual memory.
5. Identify different ways of communicating with I/O devices and interfaces.

Unit I: Basic Structure of Computers  
(7 Hrs)  
Functional Units, Basic operational concepts, Bus structures Addressing modes, subroutines: parameter passing, Instruction formats, expanding opcodes method.

Unit II: Basic Processing Unit  
(8 Hrs)  
Bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Microprogrammed Control, microinstruction format, Bit slice concept.

Unit III: Arithmetic Unit  
(7 Hrs)  
Number representations and their operations, Design of Fast Adders, Signed multiplication, Booth’s Algorithm, bit-pair recoding, Integer Division, Floating point numbers and operations, guard bits and rounding.

Unit IV: The Memory System  
(8 Hrs)  
Various technologies used in memory design, higher order memory design, multimodal memories and interleaving, Associative Memory, Cache memory, Virtual Memory.

Unit V: Input /Output Organization  
(7Hrs)  
I/O mapped I/O and memory mapped I/O, interrupts and interrupts handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Direct Memory Access COMPUTER PERIPHERALS: I/O devices such as magnetic disk, magnetic tape, CDROM systems.

Unit VI: RISC Philosophy  
(8 Hrs)  

Text Books:

References Books:

BHUL201 PRINCIPLES OF MANAGEMENT  
(4-0-0-4)  
Total Hrs: 45

Pre-requisite: NA  
Co-requisite: NA

Course Objectives:
1. This course introduces idea of management issues viz. Marketing, Financial, Human Resource and its planning.
2. It also indicates skills about the past structure of organization and its Behavior and future improvements.
3. It also provide detailed study of information management systems related with policy, implementation, and other applications related to all areas of the organization /s) enabling decision making smooth and faster.

Course Outcomes:  
Upon successful completion of the course, students will be able to
1. Understand the basic structure and function of Management, planning of management issues.
2. Identify and study broad aspects of Management issues viz. Financial, Marketing, Human Resource
3. Understand the structure and behavior of organization.
4. Develop an information management systems related with policy, and applications related to all areas of the organization(s).
5. To develop decision making processes

Unit I: Introduction (7 Hrs)
Nature and Functions of Management, Management yesterday and today, Planning and Decision making.

Unit II: Management Information System (8 Hrs)

Unit III: Marketing Management and Planning (7 Hrs)

Unit IV: Financial Management (8 Hrs)

Unit V: Human Resource Management (7 Hrs)

Unit VI: Organization Structure and Behavior (8 Hrs)
Organization Behavior: Organization Structure and design. Designing Effective Organization, Managing Job Stress, Organization Development

Text Books:
3. William Werther and Keith Davis, ‘ Human Resources and Personal Management’
4. V S Ramaswamy and S Namakumari, ‘Marketing Management’

BECP209 HARDWARE MAINTENANCE AND TROUBLESHOOTING (0-0-2-2)
Total Hrs: 20
Pre-requisite: NA
Co-requisite: NA

Course Objectives:
1. This course introduces study of different hardware Units of system and its assembly.
FOURTH SEMESTER

BAML208 GRAPH THEORY AND COMBINATORICS (4-0-0-4)  Total Hrs: 45

Pre-requisite:  Applied Mathematics III
Co-requisite:  NA

Course Objectives:
1. This course introduces size and kind of objects.
2. It also skills to analyze objects meeting the criteria, finding "largest", "smallest", or "optimal" objects.
3. It also introduces combinatorial structures and apply algebraic techniques to combinatorial problems.

Course Outcomes: Upon successful completion of the course, students will be able to
1. Understand grouping of objects and operation, Relation , ordering of objects.
2. Application of Set theory.
3. Understand Groups and Rings , their types and Applications of it
4. Understand Data structure used to represent different kinds of objects viz Graph, Trees.
5. Understand the basics of combinatorial structure and develop algebraic technique to solve combinatorial problems

Unit I: Set Theory  (7 Hrs)

Unit II: Group  (8 Hrs)
Algebra or Algebraic systems like semigroup, monoid, and examples. Homomorphism, Isomorphism of semigroup & monoid. Groups, properties of algebraic groups. Permutations groups, Subgroups, Cosets, Lagranges theorem, properties of cyclic groups, generator of group, kernel of Homomorphism, quotient group, fundamental theorems & Homomorphism of groups, Residue classes & Fermats theorem.

Unit III: Rings  (7 Hrs)

Various lattices, composition tables, Lattice $B_n$. Boolean algebra; Boolean Expressions, Equivalence of Boolean resion by tables, Simplification of circuit & equivalent circuit by truth tables.

Unit IV: Graph Theory  (8 Hrs)
Graphs and its types, subgraph, Quotient graph, Euler path, Complete path, Indegree, outdegree, reachability, cycle, matrix representation of graph. Transitive closure of graph, Adjacency matrix, Trees, Venn diagram, Representation of trees, binary trees, spanning trees, Prims algorithm.

Unit V: Combinatorics: (7Hrs)
Definition of generating functions and examples, proof of simple combinatorial identities, Probab. G.F. $p(t) = \sum p_n t^n$, $E(x) = p(t)$, examples.
Recursive relations: definitions & examples, explicitly formula for sequence, back tracking to find explicit formula of sequence, solving recurrence relations. Counting Theorem and application, Equivalent sets, cardinal numbers, denumerable sets. Multiplication principle of counting. Permutation & Combination with examples. The pigeon hole principle & extended pigeon hole principle and application of pigeon hole principle in solving simple problems.

Unit VI: Number Theory:  (8 Hrs)
Examples of continued fractions. The study of continued fractions. Alpha has infinite continued fraction if alpha is irrational. Alpha has periodic continued fractions if alpha is quadratic irrational. Application to approximation of irrationals by rationals. Hurwitz’s theorem, Advanced topic on Combinatorial Theory.

Text Books:
1. Discrete Mathematical structure with application to computer science by Trembley & Manohar (Mc. Graw Hill)
2. Discrete Mathematical Structure by Kolmann, Busby & Ross (PHI)

References:
1. Liu, ‘Discrete Mathematics’

BCSL301 THEORY OF COMPUTATION (3-1-0-4)  Total Hrs: 45

Pre-requisite:  NA
Co-requisite:  NA

Course Objectives:
1. This course introduces to students general idea of finite state and automata theory.
2. Making students aware of regular languages, context free languages. And its usefulness in finite state machines.
3. It is aimed at developing skills to provide solutions to variety of real life applications which involve finite automata.

**Course Outcomes:**
Upon successful completion of the course, students will be able to
1. Understand basics of finite state and automata theory
2. Develop an appropriate technique for finite state problems and analyze them with selection of determined states and non deterministic states.
3. Identify the advanced machines designed using finite state theory

**Unit I: Mathematical preliminaries** (7 Hrs)
Sets, operations, relations, strings, transitive closure, count ability and diagonalisation, induction and proof methods- pigeon-hole principle and simple applications – concept of language – grammars and production rules – Chomsky hierarchy.

**Unit II: Finite automata & regular expressions** (8 Hrs)
Finite State machine, regular languages, deterministic finite automata, conversion to deterministic automata, E-closures – regular expressions, finite automata, and minimization of automata, Moore and Mealy machine and their equivalence.

**Unit III: Regular grammar & context free grammar** (7 Hrs)
-Pumping lemma for regular sets- closure properties of regular sets- decision properties for regular sets, equivalence between regular language and regular grammar. Context – free languages – parse trees and ambiguity , reduction of CFGS ,Chomsky and Griebach normal forms.

**Unit IV: Push – down Automata (PDA)** (7 Hrs)
non Determinism – acceptance by two methods and their equivalence, conversion of PDA to CFG CFLs and PDAs- closure and decision properties of CFLs

**Unit V: Turing machines** (12 Hrs)
variants – recursively enumerable (r.e.) set – recursive sets ,TM as computer of function – decidability and solvability – Halting Problem – reductions – Post correspondence Problem (PCP) and unsolvability of ambiguity problem of CFGs, Church’s hypothesis, Introduction to recursive function theory – primitive recursive and partial recursive functions ,

**Unit VI: Trends and Applications of Automata** (4 Hrs)
Recent trends in Theory of computation,

Advanced topics & its Application

**Reference Books**
1. John Martin, ‘Introduction Of Automata Theory, Languages and computation’

**BCS1302 SYSTEM PROGRAMMING (4-0-4-4)**

**Course Objectives:**
Upon successful completion of the course, students will be able to
1. Understand Basic concepts of system programming.
2. Understand Utility programs, subsystems, multiple-program systems
3. To design Linker, Loader, Assembler and .object file format

**Unit 1:**
Assembler Concept of assembler, design of single pass and two pass assembler.

**Unit II: Microprocessor** (8 Hrs)
Microprocessor- Concept of macro, macro call within macro, macro definition within macro, recursive macro calls, design of macro processor.

**Unit III: Linker and Loader** (7 Hrs)
Linker and Loader- Concept of static and dynamic relocation, external symbols, design of linker, design of object file for different loading schemes.

**Unit IV: Common Object file format & System Utilities** (8 Hrs)
Common Object file format & System Utilities- Structure of object file and executable file, section or segment headers, symbol table, concept of storage class, string various, data types line insert, character, arrays structures. Source code control system, make, link editor, symbolic debugger.
Unit V: Unix Device Drivers (7 Hrs)
Unix Device Drivers - Definition, Anatomy and Types, Device programming, installation, Incorporation of driver routines, Basic device driver operation, Implementation with Line Printer & Disk, Comparative study between device drivers for UNIX & Windows.

Unit VI: Linux System Programming (8 Hrs)
Basics, Concepts, Writing, implementation of virtual machines

Text Books:
1. Lila & Beg, 'System Programming'.
2. George Pajari, 'Unix Device Drivers', Pearson Education.

Reference Books:
1. System Programming and Operating systems - D. M. Dhamdhere
2. Unix system Utilities manual.
3. Unix programming Environment - Kerringham and Pike, Pearson Education

BITL202 OBJECT ORIENTED PROGRAMMING THROUGH C++ (3-1-0-4) Total Hrs: 45
Pre-requisite: Data Structure Using C
Co-requisite: NA

Course Objectives:
1. This course introduces student’s general idea and concepts of object oriented programming.
2. It is also aimed at developing skills to implement these concepts.
3. The course provide carrier opportunities in design of some applications as object oriented concepts plays dominant role in software development

Course Outcomes:
Upon successful completion of the course, students will be able to
4. Understand Basics of object oriented programming
5. Develop applications using these concepts
6. Understand advanced technique such as handling templates, Exceptions and Dynamic allocations of memory

Unit I: Principles of Object Oriented Programming (8 Hrs)
Differences between C and C++. A look at procedure Oriented programming, object oriented programming paradigm, basic concepts of OOP, Benefits of OOP, OO languages, A sample program, structure of C++ program. Introduction to OOPS: The origins of C++, What is Object Oriented Programming?, Some C++ fundamentals, Headers & Name Spaces, Introducing C++ Classes, Function overloading, Operator overloading, Inheritance, Constructors & destructors, Function & Operator Overloading:

Unit II: Overloading (10 Hrs)
Constructor functions, Localizing variables, Function overloading & Ambiguity, Finding the address of an overloaded function, this Pointer, Operator overloading, References, Using reference to overload a unary operator, Overloading, overriding, Applying operator overloading.

Unit III: Inheritance, Virtual Functions and polymorphism (6 Hrs)
Inheritance and the access specifies, Constructors and Destructors in derived classes, Multiple Inheritance, Passing parameters to a basic class, Pointers and references to derived types, Virtual Functions, Why virtual functions?, Pure virtual functions and abstract types, Early Vs Late binding.

Unit IV: Static & Dynamic memory allocation (8 Hrs)
Static & Dynamic allocation using new and delete, static class members, Virtual base classes, const member functions and mutable, volatile member functions, Using the asm keyword, linkage specification, The.* and ->* operators, Creating conversion functions, Copy constructors, Granting access, namespaces, Explicit constructors, typename and export

Unit V: Templates (5 Hrs)
Class templates, class templates with multiple parameters, function templates, function templates with multiple parameters

Unit VI: Exceptions Handling (8 Hrs)
Exception Handling, fundamentals, options the uncaught exception ( ), Applying exception Handling, and RTTI, casting operators, Recent trends in Object Oriented Programming in C++, Advanced topics & its Application

Text Books:

Reference Books:
1. Y. Kanetkar, ‘Let’s C++’, BPB publications

BITP202 OBJECT ORIENTED PROGRAMMING THROUGH C++ [0-0-2-1] Total Hrs: 20
Pre-requisite: Data Structure using C
Co-requisite: NA

List of Practical:
1. Write a Program to perform various operations on complex numbers
2. Prepare salary chart of an employee using Structures.
3. Write code to demonstrate the creation of class & object.
4. Programs to define Class using constructor & destructor.(Default constructor ,Multiple constructor, Copy constructor, Overloaded constructor)
5. Write a Program to maintain employee record using Classes.
6. Write a Program to illustrate Multiple Inheritance.
7. Demonstrate the concept of overloading unary & binary operators.
8. Write a program to show the concept of function overloading.
9. Write A Program to illustrate Dynamic Memory Allocation using Pointers.
10. Write code to show compile time polymorphism.(static binding)
11. Write code to show run time polymorphism(dynamic binding)
12. Create a class code & illustrate the use of THIS pointer.
13. Demonstrate the formatting of output using manipulators.
14. Create templates & demonstrate their use.
15. Write code to demonstrate exception handling.
16. Open ended practical

BCSL402 DATA COMMUNICATION [3-1-0-4]

Total Hrs: 45

Pre-requisite: Basics of Electronics
Co-requisite: NA

Course Objectives:
1. This course introduces students basics of data communication and basic technique used to transfer data.
2. The course provide career opportunities in design, implement, operate & manage enterprise work.
3. Understand advanced technique such as Data encoding and Compression.

Course Outcomes:
Upon successful completion of the course, students will be able to

1. Understand Basics of data communication
2. Identify the techniques involved in the data transfer process
Understand advanced technique such as Data encoding and Compression

Unit I: Signals
(8 Hrs)
ANALOG AND DIGITAL: Analog and digital data, Analog and digital signals; PERIODIC AND APERIODIC SIGNALS, ANALOG SIGNALS: Simple analog signals; TIME AND FREQUENCY DOMAINS; COMPOSITE SIGNALS: Frequency spectrum and Bandwidth; DIGITAL SIGNALS: Decomposition of digital signal; TRANSMISSION MODES: Serial and Parallel transmission, Asynchronous and Synchronous Transmission, Simplex, Half-Duplex and Full-Duplex communication

Unit II: Encoding And Modulation
(8 Hrs)
DIGITAL-TO-DIGITAL CONVERSION: Unipolar, Polar, Bipolar; ANALOG-TO-DIGITAL CONVERSION: Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM), Sampling Rate, How many Bits per Sample? Bit rate; DIGITAL-TO-_ANALOG CONVERSION: Aspects of Digital-to-Analog conversion, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase shift Keying (PSK), Quadrature Amplitude modulation (QAM), Bit / Baud comparison; ANALOG-TO-ANALOG CONVERSION: amplitude modulation (AM), Frequency Modulation (FM), Phase Modulation (PM)

Unit III: Interfaces and Modems
(Hrs: 8)
DIGITAL DATA TRANSMISSION: Parallel transmission, Serial Transmission; DTE-DCE INTERFACE: Data Terminal Equipment (DTE), Data Circuit-Terminating Equipment (DEC), Standards, EIA-232 Interface; OTHER INTERFACE STANDARDS: EIA-449, EIA-530.

Unit IV: Communication Media
(Hrs: 7)
GUIDED MEDIA: Twisted pair cable, Coaxial cable, Optical Fiber cable; UNGUIDED MEDIA: Radio frequency allocation, Propagation of Radio waves, Terrestrial microwave, Satellite communication, Cellular Telephony; TRANSMISSION IMPAIRMENTS: Attenuation, Distortion, Noise; PERFORMANCE: Throughput, Propagation Speed, Propagation time;

Unit V: MULTIPLEXING
(Hrs: 7)
FREQUENCY DIVISION MULTIPLEXING (FDM), TIME DIVISION MULTIPLEXING (TDM): Inverse Multiplexing, WAVE-DIVISION MULTIPLEXING, MULTIPLEXING APPLICATIONS: THE TELEPHONE SYSTEM: Common carrier services and hierarchies, Analog services, Digital Services, FTTC: FTTC in the Telephone Network, FTTC in the Cable TV Network.

Unit VI: Data Compression
(Hrs: 7)
Huffman code, Run-Length Encoding, Relative Encoding, Lempel-Ziv Encoding, Image Compression, JPEG, MPEG. Recent trends and advanced topic on Data Communication

Text Books:
1. Behrouz A. Forouzan, ‘Data Communications and

Reference Books:
1. Kennedy, 'Electronic communication Systems'
2. Singh and Sapre, 'Communication systems'
3. Fred Halsall, 'Data communication', Pearson Education.

BCSP402 DATA COMMUNICATION [0-0-2-1]

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List of Practical:
1. Study of basic data communication system.
2. Demonstrate Analog and digital signals.
3. To Convert Analog signal into digital signal.
4. To Convert digital signal into Analog signal .
5. Study of Amplitude modulation.
7. Study of Phase modulation.
8. Study of Amplitude shift keying.
9. Study of Frequency shift keying.
10. Study of Binary Phase shift keying.
11. Study of Quadrature amplitude shift keying.
12. Study of Frequency division Multiplexing(FDM)
13. Study of Time division Multiplexing(TDM)
15. Study of Twisted pair cable, Coaxial cable and Optical Fiber cable.
*Open ended design of Practical

BCSP202 SHELL PROGRAMMING [0-0-2-2]

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Pre-requisite: Basics of Computing
Co-requisite: NA

Course Objectives:
1. This course introduces basics of shell programming concepts.
2. It is aimed at developing skills to shell scripts and Linux environment.
3. Shell scripts can range in complexity from simple to massive applications.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand Basics of shell script
2. Understand Linux environment so they can develop applications related to system programming.

List of practical:
1. Write a shell script to write your user name as a banner to the front of the file being sent to the printer
2. Write a shell script to print the first five arguments in reverse order
3. Write a shell script to append a line to the file. Both the file name and line have to be specified to the script at the command line. Ensure that it runs the sh shell script. Print the number of lines in the file after you done.
4. Write a shell script that tests and print outs the name of all the files in a directory that are executable. Do not print any other file or directory names. If there are subdirectories, go down recursively. How would you change this script to not go down recursively?
5. Write a shell script that given a person’s UID, tells you how many times that person is logged on
6. Write a shell script called lsdirs which lists just the directories in the current directory
7. Write a shell script called see taking a filename name as argument which uses Is if the file is a directory and more if file is otherwise
8. Write a shell script that asks a user to type word in, then tells the user how long that word is.
9. In many versions of unix there us a –i argument for cp so that you will be prompted for confirmation if you are about to overwrite a file. Write a script called cpi which will prompt if necessary without using the –i argument.
10. Write a shell script that takes a uid as an argument and prints out that persons name, home directory, shell and group number, and other groups that person may belong to.
11. Sort /etc/passwd using the uid as the key.
12. a) Write a program to generate Machine Op-Code Table , Symbol Table and Pseudo Op-Code table during First Pass Assembler. b) Write a program to generate Machine Op-code table using Two pass Assembler.
13. a) Write a program to Generate Macro Name Table , Macro definition Table and Argument List Array during Pass One of Two Pass Macro. b) Write a program to generate Expanded Source in Pass Two of Two Pass Macro.
14. Design a shell script where there are three hard links of a file named calendar.sh date.sh and list.sh. the script should behave differently depending on the name of the script through which it is run a)To find which number is greater amongst the three entered number b)Design a shell script by which only the word “DDU” is displayed from the lines in any file
15. Design a shell script for user-interactive calculator using function.

Practical beyond Syllabus:
1. Design shell script for lexical analyzer
2. Design shell script for YACC

MBL103: GENERAL PROFICIENCY-III: Hobby classes

For syllabus : please refer electronics engg. Departments syllabus in fourth semester

BCSL303 DATABASE MANAGEMENT SYSTEMS (3-1-0-4) Total Hrs: 45
Pre-requsite: NA
Co-requsite: NA

Course Objectives:
1. This course introduces general idea of database management system.
2. It is aimed at developing skills to design databases using data modeling and design techniques.
3. It is also aimed at developing skills to implement real-life applications which involve database handling,
4. It is also provide carrier opportunities in subject areas of designing, storage techniques and data handling and managing techniques

Course Outcomes:
1. At the end of the course the student shall be able to:
2. Know Basics of database management system
3. Identify data models and design techniques involved in the database design process
4. Develop an application for handling data in real life applications.
5. Know advanced storage methods, indexing techniques, optimization techniques, transaction management processes in database handling.

Unit-I: Database System Concepts and Architecture (8 Hrs)
Concept of relational database, Relational data model, Relational algebra, SQL-the relational database standard, introduction to PL/SQL.

Unit-II: Database Design Theory (8 Hrs)
Functional dependencies and normalization, relational database design algorithms, practical database design and demoralization, Relational constants, programmatic ways for implementing constraints, triggers.

Unit-III: Physical Database Design and Memory Management in Database (9 Hrs)
Concept of physical and logical hierarchy, storage, concepts of index, B trees, hash index, function index, bitmap index, database buffer management, log buffer management code reuse, concept of two-tier and N-tier architecture. Database recovery technique. Aries Algorithm for recovery.

Unit-IV: Query Optimization and Performance Tuning (8 Hrs)
Various techniques for query optimization, strong and weak equivalence, cost base optimization, Use of different storage structures in query optimization,

Unit-V: Transaction Management (10 Hrs)
Transaction Processing - Transaction and system concepts, Desirable properties of transaction, Schedules and recoverability, serializability of schedules, concurrency control, lock-based protocols and time stamp based protocols, read consistency.

Unit-VI: Trends in Database Management (2 Hrs)
What is NoSQL, History of NoSQL, Important characteristics of NoSQL categories of NoSQL.. Google Database, Twitter and Social networking databases

Text Books:
2. Database System Concepts by Henry Korth

Reference Books:
3. Database Systems by Connolly, 3rd edition, Pearson Education

BCSP303 DATABASE MANAGEMENT SYSTEMS (0-0-2-1) Total Hrs: 20

List of Practicals

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Title of Practical</th>
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<tbody>
<tr>
<td>1</td>
<td>Configure and Install PostgreSQL followed by Connect to PostgreSQL GUI</td>
</tr>
<tr>
<td>2</td>
<td>Create the University schema using the commands in the DDL and insert sample data in it</td>
</tr>
<tr>
<td>3</td>
<td>Execution of basic Basic SQL: Assignment 1</td>
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<tr>
<td>4</td>
<td>Execution of basic Basic SQL: Assignment 2 (Railway schema)</td>
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<tr>
<td>5</td>
<td>Execution of Intermediate SQL: Aggregates and grouping and ordering: Assignment 3</td>
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<td>6</td>
<td>Execution of Nested Subqueries and SQL Updates: Assignment 4</td>
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<td>7</td>
<td>Execution of SQL DDL and updates: Assignment 5</td>
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<td>8</td>
<td>Schema creation and constraints: Assignment 6</td>
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<tr>
<td>9</td>
<td>Create an ER diagram for Real world scenario specified in Assignment 7</td>
</tr>
</tbody>
</table>
At the end of the course the student shall be able to:
1. Know Basics of operating system
2. Identify mechanism to handle processes, memory, I/O devices, files and develop an appropriate algorithm for it.
3. Know advanced and different types of operating systems developed and its advantages and features

Course Outcomes:
At the end of the course the student shall be able to:
1. Know Basics of operating system
2. Identify mechanism to handle processes, memory, I/O devices, files and develop an appropriate algorithm for it.
3. Know advanced and different types of operating systems developed and its advantages and features

Unit-I: Introduction (6 Hrs)
Evolution of OS, Types of OS, Basic h/w support necessary for modern operating systems, services provided by OS, system programs and system calls, system design and implementation.

Unit-II: File Systems (10 Hrs)

Unit-III: Process And Its Scheduling (10 Hrs)
Process concept, process control block, Types of scheduler, context switch, threads, multithreading model, goals of scheduling and different scheduling algorithms,

Unit-IV: Memory Management (10 Hrs)

Unit-V: Process management and synchronization:
Concurrency conditions, Critical section problem, software and hardware solution, semaphores, conditional critical regions and monitors, classical inter process communication problems

Unit-VI: Deadlocks detection & avoidance: (10 Hrs)
Deadlock definitions, Prevention, Avoidance, detection and Recovery, Goals of Protection, access matrix, Deadlock implementation

Content beyond the syllabus (4 Hrs)
Recent trends in Operating System, Introduction to Advanced OS & its Application

Text Books:

Reference Books:

BCSL305 PRINCIPLES OF PROGRAMMING LANGUAGE (4-0-0-4) Total Hrs: 45
Pre-requisite: NA
Co-requisite: NA
Course Objectives:
1. This course introduces the general ideas of programming concepts.
2. Making students aware of basic programming paradigms, the principles and techniques involved in design and implementation of it.
3. It is aimed at developing skills in design and implementation of it.

Course Outcomes:
At the end of the course the student shall be able to:
1. Know Basics of programming language constructs
2. Identify mechanism to implement real life applications involving principles and techniques of programming
3. Know advanced implementation techniques and tools in programming

Unit-I : Introduction (12 Hrs)
Definition of Programming language, Implementation of high-level languages, Data elements, binding time, binding identifiers to names, binding of attributes, Binding time. Concept of r-value and l-value and their implementation. Effect of Environment on a language, Language paradigms. Language translation issues.

Unit-II : Data Types (10 Hrs)
Course Objectives:
1. This course introduces basic concepts of networking and its architecture while making them aware of functions of each layer in architecture.
2. It also developed skills to understand standards employed in computer networking.
3. The course also provide carrier opportunities in subject areas of protocols design and network components contributing the design.

Course Outcomes:
At the end of the course the student shall be able to:
1. Know Basics and protocols in computer networking
2. Identify IEEE standards employed and network components used in computer networking
3. Know techniques involved in developing each layer in computer networking.

Unit-I: Introduction (9Hrs)
The use of computer networks. Network hardware. LAN’s, Man’s, WAN’s, internet works, Network software, protocol hierarchies, design issues for layers, interfaces and services, Connectionless oriented and connectionless services, service primitives, relationship of Services to protocols, the OSI reference model, TCP/IP reference model, comparison of OSI And TCP/IP reference model

Unit-II: Physical Layer (8Hrs)
The theoretical basis for data communication-Fourier analysis, bandwidth-limited signals, Maximum data rate of a channel, transmission media-magnetic media, and twisted pair coaxial Cable, fiber optics. Wireless transmission, microwave transmission. Multiplexing, switching, Narrow and ISDN - services, architecture, interface, perspective on N-ISDN, broadband ISDN & ATM-virtual circuits versus circuit switching, transmission in ATM networks, ATM Switches.

Unit-III: Data Link Layer (9Hrs)
Design issues - services provided to the network Layer, framing, error control, flow control, Error correcting & detecting codes, elementary data link protocols, simplex stop and wait Simplex protocols for noisy channel, sliding window protocols-one bit protocol, go back Protocol, selective repeat protocol. The medium access sub layer - static and dynamic channel Allocation in LANs and MANs, Multiple access protocols - ALOHA. CSMA, collision free Protocols, limited contention protocols, IEEE 802.11 wireless LAN protocols, IEEE Standards 802 for LAN and MANs-802.3 & Ethernet, token bus. Token ring.

Unit-IV: The Network Layer (9Hrs)
Design issues, services provided to the transport layer, internal organization, comparison of Virtual circuit and datagram subnets, routing algorithms. Optimality principle, shortest path Routing, flooding, flow-based routing, distance vector routing, link state routing, hierarchical Routing, broadcast & multicast routing,
congestion control algorithms, general principles
Prevention policies, traffic shaping, flow specifications,
congestion control in virtual circuit Subnets choke
packets, load shedding, jitter control. IP protocol, IP
address. Subnets, internet Control protocols, OSPF.
BGP.

Unit-V: Transport and Application Layer (8 Hrs)
Transport and Application Layer - services provided to
the upper layer, Quality of Service, Transport service
primitives, elements of transport protocols, addressing,
establishing a Connection, releasing a connection, flow
control & buffering, multiplexing, crash recovery

Unit-VI: Trends And Applications (3Hrs)
Bluetooth protocol stack, Bluetooth connections,
piconets and scatternets, WiFi and WiMAX Standard
Recent trends and advance topics.

Text Books:
1. Data Communication & Networking by Behrouz A.
Forouzan McGraw Hill

Reference Books:
1. Computer Networks Third Edition by Andrew
Tanenbaum (PHI Pub.)
William Stallings (PHI Pub.)

BITP302 COMPUTER NETWORKS (0-0-2-1) Total Hrs: 20

List of Practical:
1. To demonstrate the operation of the Ethernet –
network using OPNET IT Guru
2. To demonstrate the implementation of the token
ring network using OPNET IT Guru
3. To demonstrate the implementation of the
Switched local area network using OPNET IT Guru
4. To demonstrate the basics of designing a network
using OPNET IT Guru
5. To examine the effect of ATM adaptation layers and
service classes on the performance of network
using OPNET IT Guru.
6. To Configure & analyze the performance of routing
information protocol (RIP) model using OPNET IT
Guru
7. To configure & analyze the performance of open
shortest path first (OSPF) routing protocol using
OPNET IT Guru
8. To demonstrate the congestion control algorithm
implemented by the TCP using OPNET IT Guru
9. To create a network cable using RJ-45 connectors.
10. To install a network interface card
11. Simulation of Dijkstra Algorithm in C
12. Simulation of Spanning tree algorithm in C
13. To configure a Wireless access point in a local
network
14. To install and configure wireless LAN card in the
computer

15. To understand the working of layer-3 switch for
address sub netting in the network.

*Open ended design of Practical.

BCSL306 SOFTWARE ENGINEERING AND PROJECT
MANAGEMENT (3-1-0-4) Total Hrs: 45
Pre-requisite: NA
Co-requisite: NA

Course Objectives:
1. This course introduces basic idea of software
engineering while making them aware of basic
mechanism of software engineering.
2. It is aimed at developing skills to provide
development solutions to variety of real life
situations which involve software engineering.
3. They learn appropriate cost estimations for
developed software.
4. This course provides career opportunities in subject
area of software requirement, software design, and
software testing quality management. Configuration management.

Course Outcomes:
At the end of the course the student shall be able to:
1. Know Basics of software engineering
2. Identify life cycle models involved in designing
software.
3. Develop an appropriate design technique for
software development problems and analyze them
with proper requirements
4. Know advanced development technique and tools
in software analysis, modeling and testing software
5. Aware of different life cycle models , requirement
dictation process analysis modeling and specification , architectural and detailed design
methods implementation and testing strategies, verification and validation techniques, Project
planning and management, Use of CASE tools

Unit-I : Introduction (8 Hrs)
An Introduction to Software Engineering, Software
Myths, Software Engineering- A Layered Technology,
Software Process Framework, Software Process Models,
The Waterfall Model, Incremental Process Models,
Evolutionary Process Models, Specialized Process
Models, The Unified Process Model, Agile Process
Models.

Unit-II:Software Planning (8 Hrs)
Software Engineering Practice An overview,
Communication Practices, Planning Practices, Modeling
Practices, Construction Practice & Deployment, System
Engineering Hierarchy, Business Process Engineering,
Product Engineering, System Modeling, Requirements
Engineering.

Unit-III :Software Analysis And Design (9 Hrs)

Unit IV: Software Testing (9 Hrs)

Unit V: Software Metrics And Software Quality Management (8 Hrs)

Unit VI: Trends in Software Engineering And Project Management (3 Hrs)
Software project management (PERT/CPM): Developing a network plan, overview of PERT/CPM, basic rules for developing network, basic rules for developing project network.
Recent trends in Software Engineering and Project Management, Advanced topics & its Application

Text Book:
1. Software Engineering: A Practitioner’s Approach (Sixth Edition) - Roger Pressman (TMH)

Reference Books:
2. Software Engineering Theory and Practice by Pfleeger, Pearson Education.

BCSP306 SOFTWARE TOOLS LAB-1 (0-0-2-1)
Total Hrs: 20

Course Objective:
This course introduces basics of Rational Rose Suite while making aware of designing and development processes involved in application development.

Course Outcomes:
At the end of the course the student shall be able to:
1. Know Basics of Rational Rose
2. Identify the exact processes involved in software development
3. Develop an appropriate function and method for software development problems and analyze them with their cost estimations

List of Practical:
1. To Study Rational Rose Suite
2. Study of testing tools and project management tools
3. Design Domain Analysis Document for the Projects using Rational Rose
   b. Web Server.
   c. Inventory Control System.
   e. Library Management.
   f. Employee Payroll System...
   g. Railway Reservation System.
   b. Web Server.
   c. Inventory Control System.
   e. Library Management.
   f. Employee Payroll System...
   g. Railway Reservation System.
5. Design Use Case Diagram for the Various Projects Rational Rose.
6. Design Interaction Diagram for the Various Projects
7. Design Sequence Diagram for the Various Projects...
8. Design Collaboration Diagram for the various projects...
10. Case Study: Object Oriented Analysis And Design Of Course Registration System.

*Open ended design of Practical

MBL 104 GENERAL PROFICIENCY-IV (Advanced Communication Skill)

For syllabus: please refer electronics engg. Departments syllabus in fifth semester
Course Objectives:
1. This course introduces student’s basic programming concepts of Java.
2. It is aimed at developing skills to built real life applications.
3. This course provides carrier opportunities in network programming and socket programming.

Course Outcomes:
At the end of the course the student shall be able to:
1. Know basics of Java Programming.
2. Identify the basic concepts, technique and issues related to application development using Java.
3. Know advanced techniques used in network programming and socket programming.

Unit-I: Introduction to JAVA, Class and Object (3 Hrs)
Introduction to data types, operators and control statements, Classes: fundamentals of classes, declaring objects, Assigning objects, reference variables, methods, constructor, variable handling and garbage collection. Methods and classes: Overloading methods, using objects as parameters, arguments passing, returning objects, recursion, access control, understanding static, introducing final, nested inner classes, storage classes, command line arguments.

Unit-II: JAVA Packages, Interface and Exception Handling (6 Hrs)
Packages and interface: Packages, access protection, importing packages, interfaces. Exception handling: Fundamentals exception types, uncaught exception, try-catch, displaying description of an exception, multiple catch clauses, nested try statements. throw, throws, finally, built in exceptions, creating own exception subclasses.

Unit-III: Multithreaded Programming (9 Hrs)
JAVA thread model, thread priorities, synchronization, messaging, the thread class, runnable interface, creating thread, creating multiple thread. using isAlive( ), join( ), thread priority, synchronization, interthread communication, suspending, resuming, stopping threads using multithreading.

Unit-IV: I/O, Applet and String Handling (12 Hrs)
I/O stream, bytes stream, character stream, pre-defined streams, reading console input reading character, reading string, writing console output, the PrintWriter class, reading and writing files, applets fundamentals, transient and volatile modifiers, using instance of strictfp, native method. String Handling: string constructor, special string operator, character extraction, string comparison, searching string, modifying a string, data conversion using valueOf( ), changing case of Characters within a string, string buffer.

Unit-V: Networking and Generic (12 Hrs)
Networking: networking basics & socket overview, client/server, reserved socket, proxy server, internet addressing, networking classes and interfaces, factory methods and instance method TCP/IP client socket, URL, URL connections, TCP/IP server socket, datagram. Special: General form of generic class and examples, creating generic method, generic interfaces, class hierarchies, erasure, generic restrictions.

Unit-VI: Recent Trends (3 Hrs)
Recent trends and advance topics.

Text Books:
1. The Complete Reference by Herbert Schild, TMH Publication

Reference Books:

BCSL312 COMPUTER GRAPHICS & VISUALIZATION (4-0-0-4) Total Hrs: 45
Pre-requisite: Applied Mathematics
Co-requisite: NA

Course Objectives:
1. This course introduces basic fundamentals of computer graphics while making them aware of basic principles of computer graphics.
2. It is also aimed at developing fundamental data structure and algorithm for modeling.
3. This course also provide career opportunities in developing Video Games, Virtual Reality applications, computer simulation, computer aided design and web design.

Course Outcomes:
At the end of the course the student shall be able to:
1. Know basics of computer graphics.
2. Identify the basic concepts for digitally synthesizing and manipulating visual contents.
3. Develop an appropriate mathematical formulation for image generation and manipulation.
4. Know advanced techniques and tools in the area of computer graphics.

Unit-I: Introduction (7 Hrs)
Introduction to Computer Graphics and Image Processing, Basic fundamentals of random scan, raster scan devices, Stereoscopic and Virtual Reality Systems, line and circle drawing algorithms.
Unit-II: Polygon Filling Methods (8 Hrs)
seed fill, fence fill, edge flag algorithm, scan conversion techniques, aliasing and antialiasing techniques, clipping algorithms

Unit-III: Transformations (9 Hrs)
Basic 2D transformation, composite transformations-translation, rotation, scaling, reflection, shear views, windowing, Introduction to 3D transformation

Unit-IV: Projections And Eliminations (8Hrs)
Three dimensional display methods, parallel, perspective projections and types, hidden line and surface elimination techniques, shading and rendering.

Unit-V: Curve Generation (10 Hrs)
Curve Generation: Cubic Spine, Braziers, B-Spline, blending of curves and other interpolation techniques, Introduction to Visualization, Applications, Visualization Techniques- parallel coordinates – a, charts (pie chart, bar chart, histogram, function graph, scatter plot, etc., graphs (tree diagram, network diagram, flowchart, existential graph, etc.) Venn diagram Euler diagram etc

Unit-VI: Trends and Applications (3Hrs)
Recent trends in Computer Graphics and Visualization, Advanced topics & its Application

Books:

BITL408 DISTRIBUTED DATABASES & OBJECT ORIENTED DATABASES (4-0-0-4) Total Hrs: 45
Pre-requisite: Database management System
Co-requisite: NA

Course Objective:
1. This course introduces student the fundamental concept of distributed and object oriented databases making them aware of techniques of designing and managing data in distributed environment.
2. It is also aimed developing skills to provide solutions to real life applications which involve distributed databases.
3. This course provides carrier opportunities in subject areas of design of distributed and object oriented databases modeling and analysis.

Course Outcomes:
At the end of the course the student shall be able to:
1. Know the basics of distributed and object oriented databases.
2. Identify methods and techniques to design the distributed and object oriented
3. Develop an appropriate mathematical formulation for optimizations techniques in manipulation and handling of data in distributed environment.
4. Know advanced technique and tools in area of distributed and object oriented databases

Unit-I: Distributed Databases Features (8 Hrs)
Distributed database management systems - review of databases and computer networks, levels of distribution transparency. reference architecture, type of data fragmentation, distribution transparency for read only applications and update applications. distributed database access primitives and integrity constraints.

Unit-II: Distributed database Design (9 Hrs)
A frame work for distributed database design, the design of database fragmentation, the allocation of fragments. translation global queries to fragment queries, equivalence transformation for queries. transforming global queries into fragment queries. distributed grouping and aggregate function evaluation, parametric queries.

Unit-III: Query Optimization (9 Hrs)
Query optimization, problems in query Optimization objectives in query process optimization. simpler representation of queries, model for query optimization, join query, general queries, ‘concept of two phase commit, resolving distributed transaction. concept of replication, snapshot on replication and multimaster replication, conflict resolution in MultiMate replication, concurrency control and database recovery in distributed databases.

Unit-IV: Concepts Of Object Oriented Data Model
(9 Hrs)
The evolution of object oriented concepts. object-oriented concepts, characteristics of an object-oriented data model, object schemas, class-subclass relationships. Inter object relationships, late and early binding, support for versioning. Similarities & differences between OODM and other data models, features of air object-oriented databases management system, OODBMS architectural approaches-extended relational model approach, semantic database approach, object oriented database programming language extension approach. DBMS generator approach. object definition language and object query language.

Unit-V: Object Oriented Databases (8 Hrs)
OODBMS architectures, performance issues in OODBMS. application selection for OODBMS, database design for an object relational database management system (ORDBMS). Structured types & ADTs. object identity, extending ER model using nested collections, storage and access methods, query processing, query optimization. design and architecture of POSTGRES,Distributed computing in CORBA and EJB.

Unit-VI: Trends of Distributed databases (2 Hrs)
Recent trends/ advance topic.

Textbooks:
1. Distributed data bases principles and systems by Ceri & Pelagatti (McGraw Hill Pub.)
2. Fundamentals of Database System by Eliniskv & Navathe (3rd Ed. Addison W.,elsey)

Reference Book:-
1. Database System - Design Implementation & Management by Peter Rob & Carlos Coronel. (Course Tech.)

BCSL414 DATA MINING & WAREHOUSING
(3-0-0-3) Total Hrs: 45
Pre-requisite: Database management System
Co-requisite: NA

Course Objectives:
1. This course introduces principles, concepts, functions and uses of data warehouses, data modeling and data mining in business.
2. A DW and DM technique is usually business driven and will work to improve the direction of the company by aligning the data warehouse technology with Business strategy.
3. This course also provide carrier opportunities In data warehouse design, query processing, data mining tools and technique.

Course Outcomes:
At the end of the course the student shall be able to:
1. Know the basic concept of data warehouse, data mining
2. Identify the architectural components and efficiently design and manage data storage using data warehousing.
3. Implement classical algorithms in data mining. Identify the application area of algorithm and apply them.
4. Know advanced technique and tools in the area of data warehouse and data mining.

Unit-I: Introduction to Data Warehousing (7 Hrs)
Introduction to Decision Support System: DSS Defined, History of DSS, Ingredients of DSS, Data and Model Management, DSS Knowledge base, User Interfaces, The DSS Users, Categories and Classes of DSSs Need for data warehousing, Operational & informational data, Data Warehouse definition and characteristics, Operational Data Stores.

Unit-II: Data warehouse architecture (7 Hrs)

Data warehouse Components, Architectural components, Data Preprocessing: Why Preprocess Data? Data Cleaning Techniques, Data Integration and Transformation, Data Reduction Techniques, Discretization and Concept Hierarchy Generation for numeric and categorical data, significant role of metadata, Building a Data warehouse, Benefits of Data Warehousing.

Unit-III: Multidimensional data Models (8 Hrs)

Unit-IV: Introduction to data Mining (10 Hrs)

Unit-V: Knowledge Discovery in Large Data Sets (10 Hrs)
Classification, Knowledge Discovery Classification Based on Association Rule Mining, Other Classification Methods Cluster Analysis: What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Clustering Methods. Introduction to Knowledge Discovery, innovative techniques for knowledge discovery, application of those techniques to practical tasks in areas such as fraud detection, scientific data analysis, web mining, Introduction to huge data sets such as Web, telecommunications networks, relational databases, object-oriented databases, and other sources of structured and semi-structured data, Problem of Large Data sets 20

Unit-VI: Recent Trends in Data Mining and warehousing (3 Hrs)
Recent trends in Data Mining and Warehousing, Advanced topics & its Application

Text Book:
1. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann.

Reference Books:

**BCSL308 LANGUAGE PROCESSORS (3-1-0-4)**

Total Hrs: 45

Pre-requisite: Theory of Computation
Co-requisite: NA

Course Objectives:
1. This course introduces student’s general idea of language processors
2. This course also introduces designing structure and implementation of it.
3. They are also aimed to develop skills to understand optimization technique.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand basic concepts of language construct
2. Identify design structure of language processors
3. Develop an implementation algorithm for language construct.
4. Understand optimization of codes and runtime environment.

**Unit-I : Introduction** (8 Hrs)
Compilers and translators, Phases of compiler design, cross compiler, Bootstrapping, Design of Lexical analyzer, LEX.

**Unit-II : Syntax Analysis** (8Hrs)
Specification of syntax of programming languages using CFG, Top-down parser, design of LL (1) parser, bottom up parsing technique, LR parsing algorithm, Design of SLR, LALR, CLR parsers, Study of YACC.

**Unit-III : Syntax Directed Translation** (9 Hrs)
Study of syntax directed definitions & syntax directed translation schemes, implementation of SDTS, intermediate notations: postfix, syntax tree, TAC, translation of expression, controls structures, declarations, procedure calls, and Array reference.

**Unit-IV : Storage Allocation And Error Handling** (8Hrs)
Run time storage administration, stack allocation, symbol table management, Error detection and recovery: lexical, syntactic, semantic.

**Unit-V : Code Optimization** (9Hrs)
Important code optimization techniques, loop optimization, control flow analysis, data flow analysis, Loop invariant computation, Induction variable removal, Elimination of Common sub expression, Code generation – Problems in code generation, Simple code generator, Register allocation and assignment, Code generation from DAG, Peephole optimization.

**Unit-VI : Trends in Language Processor** (3 Hrs)
Recent trends in Language Processor, Compiler tools, Advanced topics & its Application

**Text Book:**

**BCSP308 LANGUAGE PROCESSORS (0-0-2-1)**

Total Hrs: 20

List of Practical:
1. Assignment to understand the syntax of LEX specifications built-in functions and variables
2. Write a LEX program to convert a number in words to integer.
3. Write a Lex Program to count no. of words & Characters supplied at a command prompt.
4. Write a lex program to identify keywords of C language.
5. What is LEX and YACC. Write a Lex Program to Count no. of lines & blanks supplied at a command prompt.
6. Write LEX specification to generate a lexical analyzer that will capitalize all the identifier names in a given program.
7. Assignment to understand the syntax of YACC specifications built-in functions and variables
8. Write a LEX program for basic desktop calculator using YACC
9. Implement a lexical analyzer in “C”
10. Write a procedure for recursive descent parser for the grammar
    a. \( S \rightarrow T S \)
    b. \( T \rightarrow [ T ] | [ T ] T | [ ] T | [ ] \)
11. Write a program to find FIRST and FOLLOW set of all non-terminals in the grammar input through keyboard or read from file.
12. Write a program to construct LL (1) parsing table for the grammar input through keyboard or read from file.
13. Justify bottom-up parsing technique is more-efficient than Top-down approach
14. Left recursive grammar is not suitable for Top-down parsing” explain with suitable example

*Open ended design of Practical.
BCSL404 DESIGN AND ANALYSIS OF ALGORITHMS (3-1-0-4)  Total Hrs: 45
Pre-requisite: Data Structure Using C
Co-requisite: NA

Course Objectives:
1. This course introduces students the general idea of analysis and design of algorithms while making them aware of basic methods of algorithm analysis and design.
2. It is also aimed at developing skills to solve real life applications which involve algorithm development.
3. The course also provide career opportunities in analysis ,design and optimization technique in algorithms.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand basic concepts of algorithm analysis and Design.
2. Identify methods used for analysis and Design of Algorithm
3. Develop an appropriate mathematical formulations in designing algorithm
4. Understand advanced techniques and tools available for algorithm analysis and development

Unit – I: Mathematical foundations (7Hrs)
summation of arithmetic and geometric series, n, n^2, bounding summations using integration, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions, Complexity calculation of various standard functions, rinciples of designing algorithms

Unit – II: Asymptotic notations (8 Hrs)
Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortized analysis, application of amotized analysis, Sorting networks, comparison networks, biontotic sorting network.

Unit – III: Advanced data structures (6Hrs)
Advanced data structures like Fibonacci heap, Binomial heap, disjoint set representation, red and black trees and their applications. Divide and conquer basic strategy, matrix operation, binary search, quick sort, merge sort, fast fourier transform.

Unit – IV: Greedy Method & Dynamic Programming (10 Hrs)
Greedy method – basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path etc. Dynamic Programming basic strategy, multistage graphs, all pairs shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem, Maximum flow networks.

Unit-V: Traversal And Search Techniques (7 Hrs)
Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking basic strategy, 8-Queen’s problem, graph colouring, Hamiltonian cycles etc

Unit - VI: Completeness Problems And Applications(7 Hrs)
NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, decision and optimization problems, Computational Geometry, Approximation algorithm algorithm and concepts based on approximation algorithms.

Recent trends in Design and analysis of algorithms , Advanced topics & its Application.

Text Books:

Reference Books:

BCSP404 DESIGN AND ANALYSIS OF ALGORITHMS (0-0-2-1)  Total Hrs: 20

List of Practical:
1. Implement the Binary search algorithm using divide & conquer technique.
2. Implement the selection sort algorithm.
3. Implement the merge sort algorithm using divide & conquer technique.
4. Implement the quick sort algorithm using divide & conquer technique.
5. Write a program to implement Matrix-chain multiplication.
6. Write a program to implement Longest common subsequence.
7. Write a program to find Huffman codes given a test set.
8. Implement the minimum cost spanning tree algorithm using kruskal’s algorithm.
9. Implement the minimum cost spanning tree algorithm using Prim’s algorithm.
10. Write a program to find all pairs shortest paths using Floyd-Warshall algorithm.
11. Write a program to implement Bellman-Ford algorithm for single source shortest path.
12. Write a program to implement Dijkstra’s algorithm for single source shortest path.
13. Write a program to implement Strassen’s algorithm for matrix multiplication.
14. Write a program to implement Ford Fulkerson algorithm for maximum flow network.
Course Outcomes:
At the end of the course the student shall be able to:
1. Identify the parallel & distributed processing models and its applications in computer science.
2. Know program partitioning and scheduling mechanisms.
3. Use Open Specifications for Multi-Processing and message passing interface appropriately

Unit-I: Parallel & Distributed Processing (8 Hrs)
Four Decades of Computing, Flynn’s Taxonomy of Computer Architecture, SIMD Architecture, MIMD Architecture, Superscalar and VLIW Processors, Multiprocessors Interconnection Networks, The PRAM Model and Its Variations, Simulating Multiple Accesses on an EREW PRAM

Unit-II: Shared Memory Architecture: (8 Hrs)
Classification of Shared Memory Systems, Bus-Based Symmetric Multiprocessors, Basic Cache Coherency Methods, Snooping Protocols, Directory Based Protocols, Shared Memory Programming

Unit-III: Message Passing Architecture (9 Hrs)

Unit-IV: Program Partitioning and Scheduling (10 hours)
Program Partitioning and Scheduling: Conditions of Parallelism, Grain Size and Latency, Grain Packing and Scheduling, Static Multiprocessor Scheduling, Program Flow Mechanisms: Control Flow Mechanism, Data Flow Mechanism, Demand-Driven Mechanism

Unit-V: Open Specifications for Multi-Processing: (10 hours)
Programming Model, terminologies and Directives, Clauses, Parallel Construct, Message Passing Interface: Communicators, Virtual Topologies, Task

Communication, Synchronization, Collective Operations, Task Creation, One-Sided Communication

Text Books:

Reference Books:

BECL410 EMBEDDED SYSTEMS (4-0-4) Total Hrs: 60
Pre-requisite: Microprocessor based System
Co-requisite: NA

Course Objectives:
1. This course introduces student’s fundamental concepts of embedded systems and its design.
2. It is aimed at developing skills to real time applications of embedded systems which consist of hardware and software.
3. This course provide carrier opportunities as embedded system engineer, software and hardware engineer.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand basic concepts of embedded system.
2. Identify real time applications consisting of hardware and software components.
3. Understand advanced computing techniques and tools in embedded systems and real time application development

Unit-I: Microcontrollers (10Hrs)
Microprocessors and Micro-controllers, Types of Micro-controllers, External memory, Processor Architecture – Harvard v/s Van Neumann; CISC v/s RISC, Microcontroller, Memory types, Software development tools like assembler, cross-compiler, emulator, and
simulator, 8051 controller, Block Diagram & Architecture.

Unit-II: 8051 (10Hrs)
8051 Instruction Set, Addressing modes & programming. 8051 Timers, Serial I/O.

Unit-III: Memory Interfacing (10Hrs)
Memory Interfacing. Programming, Real time interfacing with LED, LED display, LCD display.

Unit-IV: PIC Micro-Controllers (10Hrs)
Overview; features, PIC 16c6x/7x – architecture, file selection register, Memory organization, Addressing modes, Instruction set, Programming.

Unit-V: ARM Micro-Controllers (10Hrs)
ARM Micro-controllers – overview; features, ARM 7 – architecture, Thumb, Register Model, Addressing modes, Instruction set, Programming.

Unit-VI: Industrial Interfacing Buses (10 Hrs)
PCI, ESA, EISA, I2C, USB, RS232. Advance topics on embedded system.

Text Books:

Reference Books:
1. Embedded System :Architecture, programming and design by Rajkamal,TMH
2. ARM Assembly Language: Fundamentals and Techniques, William Hohl, CRC Press

BEC5410 EMBEDDED SYSTEMS (0-0-2-1) Total Hrs:20
List of Practical:
1. Study of Microcontroller tools
2. Write a program to perform arithmetic Operation using 8051 Microcontroller.
3. Write a program to perform addition of two arrays using 8051 Microcontroller
4. Write a program to perform Array Sorting
5. Write a program to perform Interrupt Operation
6. Write a program to interface with LED Display
7. Write a program to perform arithmetic Operation using PIC Microcontroller
8. Write a program to perform addition of two arrays using PIC Microcontroller
9. Write a program to perform arithmetic Operation using ARM7 Microcontroller
10. Write a program to perform addition of two arrays using ARM7 Microcontroller
11. Write a program in C for interfacing the Display using PIC Microcontroller
12. Open Ended Mini Project

BCSP313 OPEN SOURCE TOOL LAB (0-0-2-1) Total Hrs: 20
Course Objective:
1. This course introduces the basic constructs available in software tools for application development.
2. This course also aimed to develop skills to identify components available in tools.

Course Outcome:
At the end of the course the student shall be able to:
1. Develop and implement modules of applications.

MBL105 General Proficiency –V "Employability Skills & Technical Report Writing"
For syllabus : please refer electronics engg. Departments syllabus in sixth semester

MBL 106 General Proficiency –VI Research Methodology Workshop
For syllabus : please refer electronics engg. Departments syllabus in sixth semester

OPEN ELECTIVES
For syllabus of open elective subjects, please refer syllabus provided in B.E. (Electronics Engineering) programme - Sixth Semester

Open Elective :
CSEL413 : GENETIC ENGINEERING
Course Objectives:
1. Explain the concept of genetic engineering and biotechnology
2. Describe the principles underlying DNA amplification and analysis
3. Explain the steps involved in cloning and expression of mammalian and plant genes in bacteria
4. Describe the various practical applications of genetic engineering and biotechnology in agriculture, industry, medicine and environmental protection

Course Outcomes
Student shall be able to
1. Understand the basic structure, specific trait of DNA, RNA, Protein.
2. Cloning the Gene that controls the trait.
3. Understand different algorithm for the DNA pattern matching, Sequences similarity.
4. Understand the various databases, with different structure for storing the large extracted data.

Unit I : Basic Genetic Engineering:
Introduction to Genetic Engineering, Importance of Genetic Engineering, Application of Genetic Engineering, Restriction Enzymes , Intron and Exon, Mutation, Cross-over, Gene Hunting

Unit II : DNA Technology
Gene expression analysis & Polymerase Chain Reaction (PCR), Nucleic acid sequences as diagnostic tools, Micro Array and Analysis, Gene Chip, DNA Finger printing, Cutting and joining DNA molecules, Principles of Electrophoresis, Agarose Gel Electrophoresis , Selective Breeding, Hybridization

Unit III DNA Sequencing and Database
Basic DNA Sequencing, Sequence analysis, Whole genome sequencing, Analyzing sequence data, chromosome walking, Jumping, Features of DNA sequence analysis, Shot gun sequencing, Homology and analogy , Orthology and paralogy, Genomics Database, Primary Database, Secondary Database, Challenges in Data Management

Unit IV Pair wise Alignments
Sub-sequences, Identity and similarity, The Dayhoff Mutation Data Matrix, The Dotplot, Global alignment: the Needleman and Wunsch algorithm, Local alignment: the Smith-Waterman algorithm

Text Book,
3. Teresa ?. Attwood and David J. Parry-Smith “Introduction to Bioinformatics” Ron Fridell “Genetic Engineering”

SEVENTH SEMESTER

BITL304 COMPUTER SYSTEM AND SECURITY (4-0-0-4)  Total Hrs: 60

Pre-requisite: Computer Network
Co-requisite: NA

Course Objectives:
1. This course covers the fundamentals of computer systems security.
2. It introduces many different areas of security such as encryption, malicious code, authentication and access control, trusted computer systems, operating system and network security.
3. The objective of this course is to provide students with a comprehensive overview of the threats to computer security, technologies for security assurance, and engineering approaches to security solutions.

Course Outcomes:
At the end of the course the student shall be able to:
1. Identify and use appropriate protection measures against malicious code
2. Apply the modern principles of physical security, authentication, and access control.
3. Learn design principles behind trusted systems, their features and the appropriate degree of assurance.
4. plan, implement, and assess security protection mechanisms in computer systems and networks.

Unit-I: Introduction (10 Hrs)
attacks, services, mechanisms, security attacks, security services, a model for internet work security, encryption model, steganography, classical encryption techniques, modern techniques - simplified DES, block cipher principles, data encryption standard, strength of DES, differential & linear cryptanalysis, block cipher design principles, block cipher modes of operation, Algorithm - triple DES, international data encryption algorithm, blowfish, RCS, CAST, RC2, characteristics of advanced symmetric block ciphers.

Unit-II: Confidentiality And Key Management (12Hrs)
Confidentiality using conventional encryption: placement of encryption function, traffic confidentiality, key distribution, random number generation. Public key cryptography: principles, RSA algorithm, key management, diffie-hellman key exchange, elliptic curve remainder theorem, discrete logarithms.

Unit-III: Message Authentication And Hash Functions (12 Hrs)

Unit-IV: Network Security Issues (12 Hrs)
authentication applications - kerberos. X.509 directory authentication service, kerberos encryption techniques, E-mail security: pretty Good privacy, S/MIME, data compression using ZIP Radix-64 conversion. PGP random number generation, IP security: overview, architecture, authentication header, encapsulating
security payload, combining security associations, key management.

**Unit-V: Web And System Security** **(10 Hrs)**

**Unit-VI: Trends And Applications Of Network Security** **(4 Hrs)**
Recent trends in Computer System & Security, Advanced topics & its Application.

**Text Books:**

**Reference Books:**
2. Introduction to Data Compression 2/c by Khalid Sayood (Morgan kaufmann/Harcourt India).

**BITP304 COMPUTER SYSTEM AND SECURITY** **[0-0-2-1]**

**List of Practicals:**
1. Write a C program: Consider a plain text message I AM A HACKER. Encrypt it with the help of the following algorithm:
   a. Replace each alphabet with its equivalent 7-bit ASCII code.
   b. Add a 0 bit as the leftmost bit to make each of the above bit patterns 8 positions long.
   c. Swap the first four bits with the last four bits for each alphabet.
   d. Write the hexadecimal equivalent of every four bits.
2. Write a C program to perform encryption and decryption using the following algorithms:
   - Caesar Cipher
   - Rail Fence Technique
   - Simple Transposition Technique.
3. Write a C program that can encrypt and decrypt using DES.
4. Write a program to implement RSA Algorithm.
5. Write a program to implement Diffie – Hellman Key Exchange.
6. Write a program to implement extended Euclidean Algorithm.
7. Write a program to implement Message Digest -5
8. Write a program to implement SHA-1 (Secure Hash algorithm)
9. To Study and analyze SHTTP
10. To Study and analyze Firewall

**BITL401 HUMAN COMPUTER INTERACTION** **(4-0-0-4)**
Total Hours: 45

**Pre-requisite:** NA

**Co-requisite:** NA

**Course Objectives:**
1. This course introduces students the concept of Human-Computer Interaction. It is also aimed to skill Interaction design methodologies.
2. This course also introduces how to apply the Human-Computer Interaction concepts to the current interaction designs.

**Course Outcomes:**
At the end of the course the student shall be able to:
1. Understand fundamental concepts in HCI;
2. Carry out a range of different types of user study and usability study;
3. Produce different types of low-fidelity and mid-fidelity prototypes;
4. Explain the entire design lifecycle, and implement a complete user-centered design process including user studies, prototyping, and evaluation;
5. Critically assess different methods and approaches in HCI; and be able to provide such critique in applied settings;
6. Describe implementation, and justify approach to, user centred design processes for a range of real-world scenarios.

**Unit-I: Introduction** **(6 Hrs)**
Introduction, A badly designed interactive system, who designs interactive systems, Engineering, What is useful or usable. Making interactive systems feel natural for users Introduction, Natural computing, Natural computing and user-centred red system design, Six principles of natural computing, Core concepts, Interactive design, Strengths and weaknesses of interactive systems.

**Unit-II: User modeling** **(10 Hrs)**

**Unit-III: Task analysis** **(8 Hrs)**
Introduction, Task analysis, Why is task analysis, Purposes of task analysis, Approaches to task analysis, Hierarchical task analysis. Functional Design – Why are we doing this? A Historical Perspective, Who Will This
At the end of the course the student shall be able to:
1. Understand the basic and operational concept of computer network fundamental.
2. Understand different modulation schemes and multiple access techniques used in wireless communications.
4. Understand the Wireless Communication Technology (Satellite, Cellular and Bluetooth networking).
5. Understand the Wireless Computer Networking (Mobile IP, WAP and wireless LANs)

Unit-I: Introduction (7 Hrs)

Unit-II: Common Cellular Components (7 Hrs)
Common Cellular System components, Common cellular network components, Hardware and software, views of cellular networks, 3G cellular systems components, Cellular component identification Call establishment.

Unit-III: Wireless Network Architecture (8 Hrs)
Wireless network architecture and operation, Cellular concept Cell fundamentals, Capacity expansion techniques, Cellular backbone networks, Mobility management, Radio resources and power management Wireless network security

Unit-IV: GSM And TDM Techniques (8 Hrs)
GSM and TDMA techniques, GSM system overview, GSM Network and system Architecture, GSM channel concepts, GSM identifiers. GSM system operation, Traffic cases, Cal handoff, Roaming, GSM protocol architecture. TDMA system, GSM system operation, Traffic cases, Cal handoff, Roaming, GSM protocol architecture. TDMA systems

Unit –V: Modulation Techniques (8 Hrs)
Wireless Modulation techniques and Hardware, Characteristics of air interface, Path loss models, wireless coding techniques, Digital modulation techniques, OFDM, UWB radio techniques, Diversity techniques, Typical GSM Hardware.

Unit –VI: Wireless Lans (7 Hrs)
Introduction to wireless LAN 802.11X technologies, Evolution of Wireless LAN Introduction to 802.15X technologies in PAN Application and architecture Bluetooth Introduction to Broadband wireless MAN, 802.16X technologies

Text Books:

Reference Books:
agents for representative AI problems – e.g., constraint satisfaction, automated theorem proving, etc.
3. Ability to communicate effectively about AI problems, algorithms, implementations, and their experimental evaluation.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand issues, concerns, and problem in computationally solving problems that are usually solved by humans.
2. Develop mathematical formulation for analysis to logic problems
3. Understand problem solving techniques to include spatial, temporal, qualitative, and common sense Reasoning

Unit-I: (8 Hrs)
Introduction: Aim and objective of AI, AI problems, AI technique, Production system Characteristics, Basics of problem solving: problem representation paradigms defining problem as a state space representation. Intelligent Agents, Performance Measure, Rationality, Structure of Agents, Problem-solving agents, Problem Formulation,

Unit-II: (8 Hrs)

Unit-III: (9 Hrs)
Constraint Satisfaction Problems, Backtracking Search, variable and value ordering, constraint propagation, intelligent backtracking, local search for CSPs, Adversarial Search, Games, The minimax algorithm, Alpha-Beta pruning, Imperfect Real-Time Decisions, Games that include an Element of Chance

Unit-IV: (9 Hrs)
Structured Knowledge Representation: Semantic Nets, Frames, and Scripts. Learning: Block architecture of learning system, Types of learning, performance Measures First order logic, Unification, and Resolution in Predicate Logic Uncertainty Treatment: formal and empirical approaches including Exact and Approximate inference in Bayesian Networks, Bayesian theory, belief functions, certainty factors

Unit-V: (8 Hrs)
Inference Techniques: Types of reasoning deductive, inductive, abductive, analogical, common-sense and non-monotonic, types of inference forward and backward chaining, inference using full joint distributions, fuzzy logic.

Unit-VI: (3 Hrs)
Recent advances in Artificial Intelligence, Algorithms for artificial intelligence, Genetic algorithms. Tools for development of Artificial Intelligence: Open Neural network library. Applications of artificial Intelligence.

Text Books:
1. Artificial Intelligence a Modern Approach: Russel and Norvig, Pearson Education, 2nd
2. Artificial Intelligence – A Practical Approach: Patterson, Tata McGraw Hill, 3rd

Reference Books:
2. Robert Levine, “A comprehensive guide to artificial intelligence and expert systems”,
4. Introduction to Artificial Intelligence by E.Charniack and D. Mcdermott, Pearson Education.

BECL423 PATTERN RECOGNITION [3-0-0-3]

Pre-requisite: Graphtheory & Combinotrics
Co-requisite: NA

Course Objectives:
1. This course introduces the Fundamentals of Pattern recognition.
2. The students skilled to choose an Appropriate feature and pattern classification algorithm for a pattern recognition problem.
3. The course also skill the students to properly implement the algorithm using modern computing tools such As Matlab, OpenCV, C, C++ and correctly.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand the nature and inherent difficulties of the pattern recognition problems.
2. Understand concepts, trade-offs, and appropriateness of the different feature types and classification techniques such as Bayesian, maximum-likelihood.
3. Identify and Select a suitable classification process, features, and proper classifier to address a desired pattern recognition problem.
4. interpret and communicate the results clearly and concisely using pattern recognition terminology classification, Clustering.
5. Implement algorithm using available resources and to properly.
Unit-I: Overview of Computer Architecture (9 Hrs)
Overview of von Neumann architecture: Instruction set architecture; The Arithmetic and Logic Unit, The Control Unit, Memory and I/O devices and their interfacing to the CPU; Measuring and reporting performance; CISC and RISC processors.

Unit-II: Pipelining and Multiple Issues Processors (9 Hrs)
Basic concepts of pipelining, data hazards, control hazards, and structural hazards; Techniques for overcoming or reducing the effects of various hazards. Linear Pipeline, Classification of Pipeline Processors, Construction Pipeline, Arithmetic Pipeline, Instruction Prefetch, Branch Handling, Data Buffering, Internal Forwarding and Register Tagging. Concepts of instruction-level parallelism (ILP), Techniques for increasing ILP; Superscalar, super pipelined and VLIW processor architectures.

Unit-III: Memory and I/O (9Hrs)
Hierarchical Memory Technology, Inclusion, Coherence and locality properties; Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies.

Unit-IV: Multithreading and Thread Level Parallelism (9Hrs)

Unit-V: Multi Core Architectures (9Hrs)

Text Books:

Reference Book:
4. Superscalar Processors: Mike Johnson.
5. Processor Architecture From Dataflow to Superscalar and Beyond Kuri J Silc Borut Robic Theo Ungerer
6. MODERN PROCESSOR DESIGN: Fundamentals of Superscalar Processors, John Shen & Mikko Lipasti

**BECL405: DIGITAL SIGNAL PROCESSING [3-0-0-3] Total Hrs: 45**

Pre-requisite: Data Communication  
Co-requisite: NA

**Course Objectives:**
1. This course introduces basics of digital signal processing.
2. The course also aimed to skill the students concepts of discrete time signal processing and systems necessary for the design
3. The course also aimed to skill the students concepts of analysis of advanced signal processing technologies.

**Course Outcomes:**
At the end of the course the student shall be able to:
1. Understand the basic concepts of discrete-time signal processing and systems necessary for the design and analysis of advanced signal processing technologies
2. Understand the concept of frequency in continuous-time and discrete-time signals.
3. Understand the basic operations that are involved in analog-to-digital and digital-to-analog converters.
4. Understand the basic operations that can be performed on digital signals and systems, and the fundamental concepts of linear time-invariance (LTI), stability, causality, and difference equation.

**Unit-I: Discrete Time Signals** (7 Hrs)
Discrete time signals and systems, classification of discrete time systems and their properties, Linear convolution, Cross Correlation, Autocorrelation of discrete signals, sampling theorem & sampling process.

**Unit-II: Frequency Domain Representation** (8 Hrs)

**Unit-III: Transform Analysis** (8 Hrs)
Transform analysis of LTI system & structure for discrete – time system. Frequency response of LTI system, Relationship between magnitude & phase response, Block diagram representation & signal flow graph representation of IIR and FIR systems. Linear constant coefficient difference equations, Basic structures for IIR systems, transposed forms, basic network structures for FIR systems, lattice structures.

**Unit-IV: Filter design Techniques** (7 Hrs)
Design of discrete time IIR filters from continuous time filters, Frequency transformation of low pass IIR filters, Design of FIR filters by windowing, FIR filter design by Kaiser and Hamming window method.

**Unit-V: Discrete Fourier Transform** (8 Hrs)

**Text Books:**

**Reference Books:**
1. Digital signal Processing Theory and application by Proakis and Manolakis, 3rd edition PHI Ltd.

**ELECTIVE III**

**BCSL416  MACHINE LEARNING [3-0-0-3] Total Hrs: 45**

Pre-requisite: NA  
Co-requisite: NA

**Course Objectives:**
1. To study principles, advantages, limitations and possible applications of machine learning.
2. To study models for supervised and unsupervised machine learning.
3. To study reinforcement machine learning and probabilistic graphical models

**Course Outcomes:**
At the end of the course the student shall be able to:
1. Understand the principles, advantages, limitations and possible applications of machine learning.
2. Understand models for supervised and unsupervised machine learning.
3. Understand reinforcement machine learning and probabilistic graphical models.

**Unit-I: Introduction** (9 Hrs)

**Unit-II: Supervised Learning** (9 Hrs)
Linear Models for Classification - Discriminant Functions - Probabilistic Generative Models - Probabilistic Discriminative Models - Bayesian Logistic Regression - Decision Trees - Bayesian Trees - Regression Trees – Pruning - Neural Networks - Feed-Forward Network - Functions - Error Back-Propagation - Regularization - Mixture Density and Bayesian Neural Networks

**Unit-III: Unsupervised Learning** (9 Hrs)

**Unit-IV: Probabilistic Graphical Models** (9 Hrs)
Directed Graphical Models - Bayesian Networks - Exploiting Independence Properties - From Distributions to Graphs - Examples - Markov Random Fields - Inference in Graphical Models - Learning – Naive Bayes Classifiers

**Unit-V: Probabilistic Graphical Models** (9 Hrs)

**Text Books:**

**Reference Books:**

**Course Objectives:**
1. This course introduces the basics of Soft computing and its application areas particularly to Intelligent systems.
2. The course also aimed to skill the students Soft Computing and hybrid intelligent systems, Neurofuzzy systems and adaptive control systems.

**Course Outcomes:**
At the end of the course the student shall be able to:
1. Understand ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
2. Understand the concepts of neural networks that can learn from available examples and generalize to form appropriate rules for inference systems
3. Provide the mathematical background for carrying out the optimization associated with neural network learning.
4. Understand concepts of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations

**Unit-I: Comparison Of Soft Computing Methods (6 Hrs)**

**Unit-II: Neural Networks (8 Hrs)**

**Unit-III: Fuzzy Set Theory (8 Hrs)**

**Unit-IV: Neuro-Fuzzy Modelling (7 Hrs)**
propagation tough time and real-time recurrent learning, Gradient-free optimization.

**Unit-V: Neuro-Fuzzy Controller In Engineering**

1. **Applications** (9 Hrs)

2. **Unit VI: Genetic Algorithm** (7 Hrs)

3. **Text Books:**
   - ‘Fuzzy Sets & Fuzzy Logic: Theory & Applications’ George Kli, Yuan, Prentice-hall Of India Pvt Ltd
   - ‘Neural Networks’ James A Freeman & David M Skapura, Pearson Education, 2002

4. **Reference Books:**
   - ‘Introduction to Neural Networks’ Jack N. Zurada, Jaico Publishers
   - ‘Elements of Artificial Neural Networks’, Kishan MeHrsotra, Sanjay Ranka, Chilukuri Mohan, Penram International Publishing Ltd.

**BECL428 WIRELESS SENSOR NETWORK [3-0-0-3]**

**Total Hrs: 45**

**Pre-requisite:** Computer Network

**Co-requisite:** NA

**Course Objectives:**
1. This course introduces advances in MEMS and wireless, sensor actuator Networks.
2. The course is aimed both at students who wish to do research in the sensor networks area, as well as at students from related disciplines, such as signal processing, wireless communications, databases, algorithms, etc., who wish to understand what new challenges sensor networks pose for their own discipline.

3. Wireless Sensor Networks provide opportunities even outside their usual application domain of environmental monitoring.

4. To track all activities, and check for errors that might occur in the process of handling and distributing goods.

**Course Outcomes:**
At the end of the course the student shall be able to:
1. Understand the existing applications of wireless sensor actuator networks.
2. Understand the elements of distributed computing and network protocol design and will learn to apply these principles in the context of wireless sensor networks.
3. Identify the various hardware, software platforms that exist for sensor networks.
4. Understand various network level protocols for MAC, routing, time Synchronization, aggregation, consensus and distributed tracking.

**Unit-I: Introduction** (8 Hrs)

- Introduction – motivation, applications, sensors, architectures, platforms for WSN, Actual Systems - Berkeley motes, Tiny OS and nesc.

**Unit-II: Programming Wireless Sensor Network** (9Hrs)

- How to program actual WSN. Wireless Radio Realities – radio irregularities and impact on protocols, MAC protocols – B-MAC, multi-channel MAC, Routing,

**Unit-III: GPS** (8Hrs)

- Directed Diffusion, Clock Synchronization, Localization – TDOA, Walking GPS, range free solutions

**Unit-IV: Power Management** (8 Hrs)

- Power Management – per node, system-wide, sentry services, sensing coverage, Data Services and Databases – architectures, queries (SQL),

**Unit-V: Security And Privacy** (8Hrs)

- Data dissemination, Programming Abstractions – programming models, EnviroTrack, new APIsSecurity and Privacy – problems, attacks, solutions.

**Unit-VI: Case Study** (4Hrs)

- A Complete System – surveillance and tracking application

**Text Book:**

**Reference Book:**

**BCSL412 SOFTWARE ARCHITECTURE [3-O-O-3]**

**Total Hrs: 45**

**Pre-requisite:** Software Engineering & Project Management

**Co-requisite:** NA
Course Objectives:
1. This course introduces basics of software testing at the function, class and application level. The course is also aimed to develop concepts of black-box (functional and boundary) and white-box (coverage-based) testing, and apply these concepts to small programs and components (functions and classes).
2. This course introduces the software engineering discipline of software quality engineering and to The legal and societal issues of software quality.
3. This course also provides the carrier opportunities in the field of software testing.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand the distinctions between validation testing and defect testing.
2. Understand the principles of system and component testing.
3. Understand the strategies for generating system test cases.
4. Understand the essential characteristics of tools used for test automation.
5. Identify Software Quality and Assurance practices and various software testing techniques through case studies.

Unit-I: Introduction (9 Hrs)
The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a “good” architecture? What software architecture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.

Unit-II: Architectural Styles And Case Studies (9 Hrs)
Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures. Case Studies: Keyword in Context; Instrumentation software; Mobile robotics; Cruise control; Three vignettes in mixed style.

Unit-III: Quality (9 Hrs)
Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles.

Unit-IV: Architectural Patterns–1 (9 Hrs)

Unit-V: Designing And Documenting Software Architecture (9Hrs)
Architecture in the life cycle; designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; choosing the relevant views; Documenting a view; Documentation across views.

Text Books:

Reference Book:
1. Design Patterns- Elements of Reusable Object-Oriented Software – E. Gamma, R. Helm, R. Johnson, J. Vlissides; Addison-Wesley, 1995.
2. Web site for Patterns: http://www.hillside.net/patterns/

BITL307 SCRIPTING LANGUAGES (3-0-0-3) Total Hrs: 45
Pre-requisite: NA
Co-requisite: Advanced webtechnology

Course Objectives:
1. This course enables students to understand web page site planning, management and Maintenance.
2. The course explains the concept of developing advanced HTML pages With the help of frames, scripting languages, and evolving technology like DHTML.
3. The main objective behind introduction of this course is also to develop web sites which are Secure and dynamic in nature and writing scripts which get executed on server as well.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understanding of basic principles of procedural computer programming.
2. Apply understanding of programming language in order to embed scripts within HTML documents to manipulate frames, browsers, windows and images and to generate pages of HTML code dynamically.
3. Understanding of scripting and the contributions of scripting languages.
4. Understanding of ASP and JSP and contribution of these languages in website development.

Unit-I: HTML/ DHTML
HTML & DHTML basics: Introduction, basic tags, tables, forms, frames.

Unit-II: XML
XML basics, understanding markup languages. Structures and syntax, validation. Well formed XML, DTD (document type Definition) classes. XSL: XML with stylesheets.

Unit-III: WML
WML basics, Writing WML code, some examples, Graphics, Templates. Forms and User input: The Options Menu, Events, Variables, and Input Tags.

Unit-IV: ASP
ASP basics, ASP Overview, Variables, Forms & Query strings, Server Variables, Sessions, Conditions/Control Flow Constructing Code: Arrays, Looping For/Loop and While/Next, Functions and Sub Procedures, VB Built In Functions, VB Script, Coding Standards: Comments, Naming Conventions, Indenting, Modular, Debugging, Error Handling, Includes Organizing Code. Object Types, Automated Tasks Working with Databases: MS Access/Database Concepts, SQL, ADO, and Reading from a table.

Unit-V: JSP
JSP basics, Course Introduction, Creating a Common Navigation Bar: Plan a Common Navigation Bar, Create Common Elements, Dynamically Change the Display of Common Navigation Elements, Building a Login System: Plan the Login System’s Logic, Create a Registration Form, Java script, Validate Form Data, Store and Retrieve Session Data, Update a Database with User Data, Personalizing a Site: Plan a Personalization System, Store Data in a Cookie, Retrieve and Use Cookie Data Test for Live Session Data, Destroy a Session.

Unit-VI: Recent Trends And Applications
Recent trends and applications of scripting languages.

Text Books:
1. XML in action web technology by William J. Pardi (P1-L1 Pub.)
2. Complete reference for HTML & DHTML.

Reference Books:
1. WAP ‘A beginners Guide’-------- Dale Bulbrook
2. WAP Development with WML and WML Script-------- Ben Forta And Keith

ELECTIVE-IV
BECL425 REAL TIME OPERATING SYSTEMS [3-0-0-3] Total Hrs: 45

Pre-requisite: Operating system
Co-requisite: NA

Course Objectives:
1. This course aims to explore the programming language and operating systems facilities essential to the implementation of real-time, reactive, and embedded systems.
2. This course also explores the limitations of industry-standard operating systems, and introduces new approaches to operating systems design that address the challenges of security, robustness, and concurrency.

Course Outcomes:
At the end of the course the student shall be able to:
1. clearly differentiate the issues that arise in designing real-time systems; analyze a variety of real-time scheduling techniques, prove correctness of the resulting schedule; implement basic scheduling algorithms;
2. apply real-time scheduling theory to the design and implementation of a real-world system using the POSIX real-time extensions; demonstrate how to manage resource access in such a system;
3. describe how embedded systems are constructed, and discuss the limitations and advantages of C as a programming language;
4. understand how managed code and advanced type systems might be used in the design and implementation of future operating systems;
5. discuss the advantages and disadvantages of integrating garbage collection with the operating system/runtime;
6. Understand the operation of popular garbage collection algorithms.

Unit-I: Introduction (9 Hrs)

Unit-II: Requirements And Design Specifications (8 Hrs)

Unit-III: Declarative Specifications And Deterministic Scheduling (8 Hrs)
DECLARATIVE SPECIFICATIONS Regular Expressions and Extensions, Traditional Logics-Propositional Logic, Predicates, Temporal logic, Real time Logic. DETERMINISTIC SCHEDULING Assumptions and Candidate Algorithms, Basic RM and EDF Results, Process Interactions-Priority Inversion and Inheritance.
Unit-IV: Execution Time Specification (8Hrs)
Measurement of Software by software, Program Analysis with Timing Schema, Schema Concepts, Basic Blocks, Statements and Control, Schema Practice, Prediction by optimization, System Interference and Architectural Complexities Timer Application, Prosperities of Real and ideal clocks, Clock Servers – Lamport’s Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization – Centralized Synchronization, Distributed Synchronization.

Unit-V: Programming Language (9 Hrs)

Unit-VI: Trends And Applications (3 Hrs)
Recent trends in Real time operating System, Advanced topics & its Application

Text Book:

Reference Book:

BECL409: DIGITAL IMAGE PROCESSING [3-0-0-3] (8Hrs)
Pre-requisite: NA
Co-requisite: NA

Course Objectives:
1. The course introduces the fundamentals of digital image processing and algorithms that are used.
2. This course also explores complex methods for a wide range of tasks such as noise reduction, Restoration, compression, feature extraction and pattern recognition.

Course Outcomes:
At the end of the course the student shall be able to:
1. understand the basic principles and methods of digital image processing,
2. Formulate solutions to general image processing problems,
3. Choose comprehensive background in image filtering, be prepared for research in image processing if you choose to go that way.

Unit-I: Introduction (8Hrs)
Origins of digital image processing, Various Imaging techniques, components of an image processing system, Image sensing and acquisition, Image sampling and quantization, neighbors of a pixel, Adjacency, Connectivity, Regions and boundaries.

Unit-II: Filtering (8Hrs)
Basic intensity transformation and spatial filtering, Image negatives, log transforms, power-law transformations, median filtering, Histogram equalization, Histogram matching spatial correlation and convolutions.

Unit-III: Transformation (8Hrs)
Two-dimensional orthogonal and Unitary Transforms, properties of unitary transforms 2D-DFT, Cosine transforms, Sine transforms, Hadamard transform, Haar transforms, Slant transforms.

Unit-IV: Image Degradation /Restoration Process (7Hrs)
Model of image Degradation/Restorations process, Noise models, Restoration in the presence of noise only, periodic noise reduction by Frequency domain filtering, Image reconstruction from Projections, Image compression models, Huffman coding, LZW coding, Run length coding, Bit-plane coding.

Unit-V: Image Morphology (7Hrs)
Some basic morphological algorithms, Boundary extraction, convex hull, thinning, skeletons, morphological Reconstruction. Color image processing, color models, RGB color models, CMY and CMYK color models the HSI color models.

Unit-VI: Image Segmentation (7Hrs)
Image segmentation, Fundamentals, Point, Line and edge detection, of segmentation, Thresholding, Region-based segmentation, watershed segmentation algorithm Applications of segmentation.

Text Book:

Reference Books:

BITL407 ADVANCED WEB TECHNOLOGIES [3-0-0-3] (8Hrs)
Pre-requisite: NA
Co-requisite: Scripting languages

Course Objectives:
1. This course introduces the basic concepts and general principles associated with web application development, illustrating specific technologies.
2. It is also aimed to provide an understanding of different concepts, architectures, techniques, and infrastructures for service oriented computing in web development.
3. This course provides career opportunities in the subject area of design of web development, web maintenance and deployment.

Course Outcomes:
At the end of the course the student shall be able to:

1. Understand the basics of web application development.
2. Identify the architectural components and technique to design and develop service oriented computing in web development.
3. Understand advanced computing technique and tools in the area of web development and maintenance

**Unit-I: Common Gateway Interface (10 Hrs)**
CGI programming language using C. CGI Techniques: Outputting Graphics, Outputting PDF, Redirecting the Browser, Using HTML Templates, Cookies, Sending E-mail Using CGI, CGI Security: Web Server Security, Writing Secure CGIs

**Unit-II: Perl (10 Hrs)**
Variables and Data Types, Expressions, Operators, and Control Structures, Functions, Arrays, Object-Oriented PHP., Strings and Regular Expressions, File I/O and the File System, Databases, PHP and Dynamic Site Development.

**Unit-III: PHP (12 Hrs)**

**Unit-IV: Dream Weaver (12 Hrs)**
Internet Access and HTML, Planning Web Sites, The Dreamweaver Environment, Viewing and Managing HTML Code, Creating a Web Site, Defining a Web Site, Creating a Basic Web Page and Page Properties, Building a Web Site, The Site Panel and Templates, Adding Content to Web Pages, List Formats and Graphic File Types, Inserting a Table and Adjusting Table Properties, Using Graphics in Table Cells and, Nested Tables, Using Table Layout View, Creating and Using a Repeating Region Template, Working with Links, Creating Internal and External Hyperlinks, Creating an Image Map and Anchors, Enhancing Navigation in a Site, Framesets Reusable Navigation Bars, Managing and Uploading a Web Site.

**Unit-V: J2ME (12 Hrs)**
J2ME specifics ME components: KVM, J2ME, CLDC, MIDP, Overview of profile system, Architecture, Differences between J2ME environments, Comparisons between J2ME and Personal Java. MIDP: Mobile information device profile, Creating MIDP applications, Midlet suites and deployment MIDP GUI: Graphical User Interfaces with MIDP Displays, Commands, Pointers, Screens Animations and drawing.

**Unit-VI: Recent Trends (4 Hrs)**
Recent trends/ advance topic.

**Text Books:**
2. Beginning PHP 5 and MySQL. W.Jason Gilmore.

**Reference Books:**
2. CGI programming in C & Perl by Thomas Boutell Addison-Wesley Publication.

**BITL410 SOFTWARE TESTING (3-0-0-3) Total Hrs: 45**

**Pre-requisite:** Software Engineering

**Co-requisite:** NA

**Course Objectives**
1. This course introduces students how to perform testing of Software.
2. This course also aimed to develop skill for dealing with Testing problems of software,
3. This course contains study of testing techniques and methodologies.

**Course Outcomes**
Upon successful completion of the course, students will be able to

1.  • Identify the emerging errors failures issues in a software environment including testing techniques and methodologies. Understanding and evaluating the type of bugs, defects and errors in software as well as risk in development of software using new technologies leads need of accuracy in software testing.
2.  • Improving Quality of software requires testing of software manually as well as automatically.
3.  • Identify and analyze recent developments testing and new automated testing tools the nature of the testing process and the identities and positions of the various stakeholders;
4.  • Considering the role of the testing in software development process; and Identify and evaluate resources and automated tools for testing software in minimum time, effort and asset.

**Unit-I: Software Testing Principles (6 Hrs)**
Need for testing, Psychology of testing, Testing economics, SDLC and Testing, Verification & Validation, QA and QC

**Unit-II: Testing Strategies (7 Hrs)**
White box testing techniques: Statement coverage – Branch Coverage – Condition coverage – Decision/Condition coverage – Multiple condition

**Unit-III: Types of Testing (10 Hrs)**

**Unit-IV: Test Management (10 Hrs)**

**Unit-V: Product and Process Metrics (10 Hrs)**
People and organizational issues: Common people issues and myths in testing, providing career paths in testing, Organizational structures for testing teams, geographically distributed testing teams and success factors. Test Metrics Product Metrics, Process Metrics, Progress Metrics, and Use of metrics in ascertaining product release

**Unit-VI: Recent Trends in Software Testing (2 Hrs)**
Recent trends/ advance topic.

**Text Books:**

**Reference Books:**

**BCSL310 MOBILE COMPUTING (3-0-0-3) Total Hrs: 60**
Pre-requisite: Computer Network
Co-requisite: Wireless communication

**Course Objectives:**
1. This course introduces students a general idea of wireless communication while making them aware of system architecture and protocols used for wireless communication.
2. It is also aimed at developing skills for wireless application protocol environment.
3. This course also provides career opportunities in this field.

**Course Outcomes:**
At the end of the course the student shall be able to:
1. Understand basic concepts of wireless communication.
2. Identify components and protocols used in system design and communication.
3. Develop an appropriate mathematical formulation for mobile communication and analyze security issues in it.
4. Understand application protocol environment needed to develop application for mobile communication.
5. Understand advanced computing technique and tools in mobile communication.

**Unit-I: Introduction (14 Hrs)**
Introduction to wireless communication, wireless transmission, frequencies for radio transmission, signal proration, multiplexing, modulation, spread spectrum, introduction to cellular system. GSM: System architecture, protocols, localization and calling, handover. GPRS,CDMA Mobile IP.

**Unit-II: Medium Access Control (10 Hrs)**
Medium access control: Motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA, Wireless LAN, Bluetooth

**Unit-III: Mobile Transport Layer (12Hrs)**
Dynamic host configuration protocol, Mobile transport layer: Traditional TCP, Indirect TCP, Snoop TCP, mobile TCP, Transaction oriented TCP.

**Unit-IV: Issues in Wireless Communication (8 Hrs)**
Security issues ,Consistency and reliability, Adhoc Network, Sensor Network

**Unit-V: Wireless Application Protocol (WAP) / WM/L WML Script: (12 Hrs)**

Unit VI: Upcoming Technologies in Mobile Computing (4Hrs)

Advanced topics & its Application in iPhone and Android

Text Books:

Reference Books:
1. Wireless and Mobile Networks Architecture By Yi Bing Lin, John Wiley
2. The Beginning WML and WML Script, Wrox Publication

ELECTIVE-V

BITL309 CYBER LAWS (3-0-0-2) Total Hrs: 45

Pre-requisite: NA
Co-requisite: NA

Course Objectives:
1. This course introduces students a critical understanding of Cyber Law.
2. This course also aimed to develop skill for dealing with frauds, deceptions (confidence tricks, scams) and other cyber crimes such as child pornography, that are taking place via Internet.
3. This course also explores the legal and policy development in various countries to regulate Cyberspace

Course Outcomes:
At the end of the course the student shall be able to:
1. Identify the emerging legal issues in a digital networked environment including general issues of jurisdiction and enforcement of rights and liabilities in cyberspace;
2. Consider developments in specific areas of law arising in cyberspace including intellectual property, regulation of content /censorship, privacy and electronic commerce;
3. Understand and evaluate how these developing concepts affect the flow of information in society and the work of information professionals;
4. Identify and analyze recent developments in national and global information policy, the nature of the policy making process and the identities and positions of the various stakeholders;
5. Identify and analyze recent developments in national and global information policy, the nature of the policy making process and the identities and positions of the various stakeholders;
6. Understand and evaluate resources and materials treating the Law of Cyberspace and IPR

Unit I:
Concepts Of Technology And Law Understanding Technology, Basic Concepts of Technology and Law Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence

Unit II: Law Of Digital Contracts (8 Hrs)

Unit III: Intellectual Property Issues In Cyber Space (8 Hrs)

Unit IV: International Scenario In Cyber Laws (10 Hrs)
Data Protection Laws in EU and USA, Child Abuse Protection Laws in EU and USA, Cyber Laws - the Malaysian Approach.

Unit V: Cyber Law Issues For Management (7Hrs)
Cyber Law Issues in E-Business Management, Major issues in Cyber Evidence Management, Cyber Law Compliance Audit

Unit VI: Trends (3 Hrs)
Recent trends and advance topics.

Text Book:

Reference Books:
1. "Cyber Laws in India.. ITA-2000 and Beyond" by Navvi

BCSL311 E-COMMERCE (3-0-0-2) Total Hrs: 45

Pre-requisite: NA
Co-requisite: NA

Course Objectives:
1. This course introduces student’s fundamental concepts of Ecommerce.
2. It is aimed at developing skills to consumer e applications and organizational applications of ecommerce.
3. This course provides carrier opportunities as web applications development and application engine design.

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand basics of E-commerce.
2. Identify the technique and issues related to application development in E-commerce
3. Understand advanced techniques and tools in area of E-commerce

Unit I: (9 Hrs)
Introduction to electronics-commerce: The scope of E-COM, E-COM and trade cycle, electronic market, electronic data interchange, internet commerce, E-Commerce in perspective, the value chain, supply chains, Electronics Commerce Software: What kind of software solutions Do you need? marketing smarts, hosting services, basic packages, midrange package, enterprise solutions for large firms. (8)

**Unit-II:** (9 Hrs)
Business to Business Electronics-commerce: Inter-organizational transactions, electronics, electronics markets, electronics data interchange (EDI), EDI technology, EDI and business, inter organizational e-com. (8)

**Unit-III:** (9 Hrs)
Business to consumer electronic commerce: consumer trade transactions, the elements of e-commerce – elements, e-visibility, the e-shop, online payment, delivering the goods, after sales service, internet e-com security, a website evolution mode e-business: Internet book shops, grocery supplier, software supplies and support, electronic newspaper, internet banking, virtual auctions, on-line share-dealing, e-diversity. (6)

**Unit-IV:** (9 Hrs)

**Unit-V:** (9 Hrs)
Electronics payment system: The basics of electronics payment systems. Electronics cash, electronics wallets, smart cards, credit and charge cards. The environment of electronic commerce: international legal, ethical and tax issues: International nature of electronics commerce, the legal environment of electronics commerce, taxation and E-COM, business plans for implementing E-COM: Planning the E-Commerce project, managing electronic commerce implementation. (5)

Recent trends in electronics-commerce, Advanced topics & its Application.

**Text Books:**
1. e-Commerce by David Whiteley (McGrew Hill Pub.)
2. Electronics-Commerce by Gary P. Schneider & James T. Perry. (COURSE TECHNOLOGY Thomson Learning)

**Reference Book:**

BITL411 ENTERPRISE RESOURCE PLANNING (3-0-0-2) Total Hrs: 45

**Pre-requisite:** Software Engineering & Project Management
**Co-requisite:** NA

**Course Objective:**
1. This course introduces student the general idea of enterprise resource planning making them aware of analyze the factors and forces which facilitate ERP systems.
2. It is also aimed at developing skills to implement ERP systems.
3. This course provides carrier opportunities in subject areas of design of ERP system used for decision making process.

**Course Outcomes:**
At the end of the course the student shall be able to:
1. Understand the basics of ERP systems.
2. Identify factors and forces which facilitate development of ERP systems.
3. Identify how organizational factors such as managements role and organizational culture contribute to successful ERP.
4. Understand advanced technique and tools for ERP system implementation.

**Unit-I: Introduction** (10 Hrs)
Introduction business needs and ERP, ERP as an overview, entries as an overview, benefits of ERP, ERP and related technologies, ERP architecture, business process reengineering, data warehousing, data mining, on line analytical processing supply choice management.

**Unit-II: ERP Implementation** (10 Hrs)
Client server architecture and ERP, ERP implementation life cycle, implementation methodologies of Implementation - the hidden cost, organizing implementations, vendors, consultants and users, contracts with vendors, consultants and employees, project management and monitoring after ERP implementation.

**Unit-III: The Business Module** (9 Hrs)

**Unit-IV: ERP Products** (7Hrs) Selection of ERP, SWOT analysis of various ERP products supply chain enabled ERP.

**Unit-V: Use Of ERP in Manufacturing / Nonmanufacturing Industry** (6 Hrs)
ERP and Electronic Data Interchange (EDI) integration, ERP in manufacturing and nonmanufacturing industries

**Unit-VI: Recent Trends in ERP** (3 Hrs)
Recent trends/ advance topic.

**Text Book:**
1. ERP Demystified by Aleris Leon (TMH Pub.).

**Reference Book:**
1. Enterprise Resource Planning by Parag Diwan and Sunil Sharma (Pentageon Pren.)

BCSL 415 CLOUD COMPUTING (3-0-0-2) Total Hrs: 45
Pre-requisite: Parallel & Distributed Computing
Co-requisite: NA

Course Objectives:
1. Understand the current technologies in Internet world
2. Explain Public and Private Cloud
3. Discuss Cloud and (new) Service Level Management
4. Discuss how to approach and evaluate a Cloud business case
5. Describe Cloud and Risk Management

Course Outcomes:
At the end of the course the student shall be able to:
1. Understand Cloud Computing Architectural Framework and different deployment models
2. Understand how the Cloud will change today’s IT
3. Point out Cloud Computing Security challenges
4. Evaluate a Cloud business case and Risk Management

Unit-I: Introduction to Cloud Computing (8 Hrs)

Unit-II: Cloud Computing Architectural Framework (7 Hrs)
Cloud architectural principles, Role of Networks in Cloud computing, Role of Web services, Benefits and challenges to Cloud architecture, Cloud Service Models, cloud computing vendors. Cloud Services Management, Performance and scalability of services, tools and technologies used to manage cloud services deployment.

Unit-III: Exploiting Cloud Services (8 Hrs)

Unit-IV: Cloud Application Development (7 Hrs)
Role of business analyst, Technical architecture considerations, Service creation environments to develop cloud based applications, Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages, Cloud Economics,

Unit-V: Cloud Security and Risk Management (8 Hrs)

Unit-VI: Analysis on Case study (7 Hrs)

Text Books:
2. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

References Books:

BCSL 417 BIOINFORMATICS (3-0-0-2) Total Hrs: 45
Pre-requisite: NA
Co-requisite: NA

Course Objectives:
This course introduces general bioinformatics concepts
1. Understand the theoretical basis behind bioinformatics
2. Students will be trained in the basic theory and application of programs used for database searching, protein and DNA sequence analysis

Course Outcomes:
At the end of the course the student shall be able to:
1. To query biological data, interpret and model biological information
2. To predict output of alignment method
   To identify various approaches and tools related to bioinformatics problem

Unit-I: (9 Hrs)
Introduction: Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction, Folding problem, Sequence Analysis, Homology and Analogy, conversion process in prokaryotes and eukaryotes

Over-view of protein structure Protein Information Resources Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases.

**Unit-II:** (9 Hrs)
Genome Information Resources DNA sequence databases, specialized genomic resources DNA Sequence analysis Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases

**Unit-III:** (9 Hrs)
Pair wise alignment techniques Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, working with BLAST and FASTA

**Unit-IV:** (9 Hrs)
Multiple sequence alignment Definition and Goal, The consensus, computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching Working with DNA microarray, Gene Clustering

**Unit-V:** (9 Hrs)
Drug Discovery Technologies, Drug Designing Approaches, Important Parameter in Drug Discovery, And Case Study of Various Tools

**Text Books:**
1. Introduction to Bioinformatics, by T K Attwood & D J Parry-Smith Addison Wesley Longman
2. Bioinformatics Methods And Applications: Genomics Proteomics And Drug Discovery by S. C. Rastogi, Parag Rastogi, Namita Mendiratta

**Reference Books:**
2. Bioinformatics: David Mount
3. Introduction to Bioinformatics by M.Lesk OXFORD publishers (Indian Edition)

**EIGHT SEMESTERS**

**BCSP414 Industrial Project Phase- II [0-0-16-16]**

**BCSP307 Self Study [0-0-0-1]**
DEPARTMENT OF MECHANICAL ENGINEERING
SCHEME OF B.E. (MECHANICAL ENGINEERING) (Autonomy)

*TAE will be based on Home Assignment, Seminar, Quiz, Surprise Test, Group Discussion, Debate, General Behavior, Attentiveness and Attendance

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**ELECTIVE – I**

- BMEL307 - Power Plant Engineering
- BMEL308 - Design of Mechanical Drives
- BMEL309 - Artificial Intelligence
- BMEL310 - Quality & Reliability Engineering
- BMEL311 - Mechanical Vibration
- BMEL312 - Advanced IC Engines

**OPEN ELECTIVES:**

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*Compulsory Industry Internship for full semester commencing from immediately after the VI semester ESE.
**At the place of Industry Internship
***Presentation of progress of Major project phase I in the college

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*In the college

ELECTIVE – II
BMEL501 - Computer Aided Design
BMEL502 - Refrigeration and Air Conditioning
BMEL503 - Finite Element Method

ELECTIVE – III
BMEL504 - Material Handling Systems
BMEL505 - Advance Manufacturing Techniques
BMEL506 - Stress Analysis
BMEL507 - Automobile Engineering
BMEL508 - Modeling and Simulation
BMEL509 - Industrial Robotics
BMEL510 - Metrology & Quality Control
III SEMESTER
BAML203 APPLIED MATHEMATICS – III (3-1-0-4)  

Pree-requisite:
1. BAML 101 Applied Mathematics-I
2. BAML110 Applied Mathematics-II

Course Objectives:
1. To learn important mathematical models used in mechanical engineering area.
2. Learn to manipulate the relevant mathematical objects with paper and pencil with mathematical software
3. Teaching of basic numeracy skills to all pupils
4. The teaching of selected areas of mathematics such as calculus as an example of intellectual achievements of modern world
5. The ability to conceptualize, inquire, reason and communicate mathematically and to use mathematics to formulate and solve the problems in daily life.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand the importance of applied mathematics in the field of engineering.
2. Select an appropriate mathematical application for given real life query.
3. Convert the query in the selected problem, solve and analyze the selected problem using learned techniques, to obtain the solution.
4. Comment on obtained solutions in a very scientific approach with quantitative basis.

Unit I: [7 Hrs]
Laplace Transforms.

Unit II: [6 Hrs]
Z- Transform
Definition and properties, inversion z-transform, z-transforms pairs, relation with Laplace transform, Application of Z-transform to solve different equation with constant coefficients.

Unit III: [6 Hrs]
Fourier Transform
Definition, Fourier integral theorem, Fourier sine & cosine integrals, finite Fourier sine & cosine transforms, Parseval's identity, convolution theorem.

Unit IV: [9 Hrs]
Complex Variables
Analytic function, Cauchy-Riemann conditions, conjugate functions, singularities, Cauchy’s integral theorem and integral formula (statement only), Taylor’s and Lautent’s theorem (Statement only), Residue theorem, contour integration, evaluation of real & complex integral by residue theorem. Conformal mapping, mapping by linear & inverse transformation.

Unit V: [6 Hrs]
Special function & series solution
Series solution of differential equation by frobanious method, Bessel’s function Legendres polynomials, Recurrence relations, Rodrigue formula, generating function, orthogonal properties of \( J_n(x) \) & \( P_n(x) \).

Unit VI: [8 Hrs]
Fourier series & Partial differential equations
Periodic function & their Fourier series expansion, Fourier series for even & function, change of interval, half range expansion.

Partial differential equation: Partial differential equation of first order first degree i.e. Langrage’s form, Linear homogeneous partial differential equation of higher order with constant coefficient, method of separation of variables, Application to one dimensional heat & diffusion equation, two dimensional Heat equations. (Only steady state).

Text Books:

Reference Books:
1. Mathematics for engineers: Chandrika Prasad
2. Advanced Mathematics for engineers: Chandrika Prasad
BMEL201 MACHINE DRAWING (3-0-2-4)
Total Hrs: 28
Pre-requisite:
1. BMEL108 Engineering Graphics

Course Objectives:
1. To study the basics of engineering drawing in mechanical engineering and applications
2. To provide the exposure to the orthographic and sectional views with dimensions
3. To study design data and for selection of standard components
4. To understand the principles and techniques of assembly drawing.
5. To be able to read production drawing with different geometrical features

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understanding basics of engineering drawing in mechanical engineering and applications
2. Get the exposure to the orthographic and sectional views with dimensions
3. Search out design data from hand books and select standard components
4. Understand the principles, techniques of assembly drawing and production drawing with geometrical and dimensional tolerances.

Unit I Drawing Standards (2 Hrs)
BIS Specification-Welding symbols, Machining Symbols, Surface Finish Symbols, Heat Treatment, Manufacturing Instructions

Unit II Interpretation of Orthographic Projection (5 Hrs)
Orthographic Projections of elements, Sectional-Multiple-Missing views, Profiles, Cross Sections, References, Alignment & Dimensioning.

Unit III Standard Practices and Study for following elements (Excluding design calculations) (4 Hrs)
Reference to Hand Book for selection of Standard Components like – Bolts, Washers, rivets, Welds, Keys and Keyways, Splins, Couplings, Cotterjoints, Fabrication Bolts

Unit IV Fits and Tolerance (4 Hrs)
Fits and Tolerance allocation for mating parts-tolerance data sheet - tolerance table preparation - Geometric Tolerance and Allowance. Indicating on the drawing of position, as per standard and as per prevalent in industry

Unit V Assembly Drawing (8 Hrs)
Principles, Techniques, Types and Standards for Preparation of assembled views given parts details - couplings: flange, universal - Bearing: footstep, Plummer block - Lathe tailstock - Stop valves, Screw Jack – etc

Unit VI Production Drawing (5 Hrs)
Elements of production drawing Information (Plates, Part list, Formats) on: tolerances, manufacturing methods, Production planning Sheet, Process planning Sheet.

Practical
1. Pencil Drawing of some standard components
2. Pencil Drawing of standard assemblies with components.
3. The students must be made to disassemble machines and take actual dimensions and prepare parts drawings, assembly drawings, exploded views and isometric views as record work.
4. Some Machines of Interest are:
   1. Lathe Chuck
   2. Gear Reducer
   3. Gear Pump
   4. Steam Stop Valve
   5. Pneumatic Cylinder assembly
   6. Pneumatic Valves
   7. Centrifugal Pump Assembly
   8. I.C. Engine Cylinder-Piston, Connection Rod And Crankshaft Assembly
   9. Automobile Gear Box
5. Computer printout of production drawing ad process sheet for two components
6. Open ended experiments.

Note: The examination must include:
1. Total Assembly Test
2. Identifying The Missing Element Of The Assembly

Text Book:

Reference Book:

BMEP201 MACHINE DRAWING
Evaluation Scheme: Practical [2P]
Total Hrs: [ ]
List of Practicals:
1. Sheet 1 : Dimensioning, Symbols (Welding, Machining & Surface Finish)
2. Sheet 2 : Orthographic Projections & Missing Views
3. Sheet 3 : Sectional Views
4. Sheet 4 : Sketching Of Machine Components
5. Sheet 5 : Keys, Cotters & Coupling Joint
6. Sheet 6 : Disassembling
7. Sheet 7 : Assembly (1 Big Assembly)
8. Sheet 8 : Production Drawing & Process Planning Sheets (On A4 Size Pages)

BMEL202 FLUID POWER I (3-1-0-4)
Total Hrs: 42
Pree-requisite: Nil

Course Objectives:
1. To understand the basic fluid properties like density, specific gravity etc
2. To understand type of fluid flows, continuity equation, ventury meter, orifice meter
3. To understand the concept of boundary layer
4. To understand the momentum equation and its application to various fluid machineries
5. To study various techniques of dimensional analysis

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Analyze the fluid dynamics of internal fluid flows in ducts of any cross section, formulate the relevant theory, and solve related engineering problems.
2. Define the physics of external fluid flows over immersed bodies, formulate the relevant theory, and solve related engineering problems.
3. Recognize how fluid flow theory can be employed in a modern mechanical Engineering design environment.

UNIT I [7 Hrs]
Properties of Fluid:
Density, Specific gravity, Specific Weight, Specific Volume Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility Fluid pressure, Pressure head, Pressure intensity Concept of absolute vacuum, gauge pressure, atmospheric Pressure, absolute pressure. Simple and differential manometers, Bourdon pressure gauge. Concept of Total pressure on immersed bodies, center of pressure.

UNIT II [7 Hrs]
Fluid Flow:

UNIT III [8 Hrs]
Flow through Pipes:
Laws of fluid friction (Laminar and turbulent), Darcy’s equation and Chezy’s equation for frictional losses. Minor losses in pipes Hydrauligradient and total gradient line. Hydraulic power transmission through pipe, Energy Gradient; Pipe in series and parallel; Branched pipes; three reservoir system; Syphon; Transmission of power through pipes; Water Hammer pressure due to sudden closure of valve.

UNIT IV [8 Hrs]
Boundary Layer Concepts:
Nominal thickness, Displacement thickness and Momentum thickness, energy of the boundary layer; Boundary layer along a long thin plate and its characteristics; Laminar boundary layer; Turbulent boundary layer; Separation of boundary layer on plane and curved surfaces. Drag & Lift: Definition of drag and lift; Flow past plates, Cylinders and sphere; Drag on sphere, cylinder and flat plate.

UNIT V [6 Hrs]
Momentum principle and its application:
Impulse- momentum principle, Calculation of force exerted on fixed plate, moving flat plates & curved vanes, Calculation force exerted on series of moving vanes, velocity diagrams & their analysis.

UNIT VI [6 Hrs]
Dimensional Analysis:
Fundamental dimensions, dimensional Homogeneity, Rayleigh’s method and Buckingham’s method, dimension less numbers and their significance. Hydraulic similitudes, Type of models, Problems related to Reynolds number & Froude number.
Text Books

Reference Book :

BMEL203 MATERIALS ENGINEERING (3-0-2-4)
Total Hrs: 42

Pee-requisite: Nil

Course Objectives:
1. To introduce various materials used in manufacturing metallic components
2. To introduce & correlate between science and Engineering of metallic materials
3. To introduce various techniques for enhancing the inherent characteristics of materials
4. To introduce the quantitative measurement of material properties.

Course Outcome:
At the end of the course the student shall be able to:
1. apply basic knowledge related to the metallic materials especially steels and cast iron.
2. understand the process of co-relation of science behind the properties of the materials will get initiated.
3. help in developing the altogether new concept of the observation of microstructure of metallic materials.
4. get sufficient theoretical knowledge about the various types of steels used and microstructure of the material.

Unit I
Constitution of alloys and Phase Diagrams
8 Hrs
Introduction to Basic Terms (System, Phase, Variables, Components Etc.) related to equilibrium diagram. Alloys and solid solutions, compounds. Polymorphism, Hume Rothery rules. Time Temperature cooling curves, Construction of equilibrium diagrams using cooling curves, Binary phase diagrams Isomorphous systems, Partial miscibility, Metallic systems completely miscible in liquid state and completely immiscible in solid state.

Lever rule, equilibrium cooling, Microstructures under equilibrium cooling conditions, Eutectic, Hyper and hypoeutectic alloys.

Unit II
Ferrous materials - Plain Carbon Steel and Alloy Steels
10 Hrs
b) Purpose of alloying, Different alloying elements and their effect on enhancing the different characteristics, Tool steels, Stainless steels, spring steels etc
Designation of steels. AISI, ASTM, EN etc.

Unit III
Cast Irons
5 Hrs
Cast iron, White cast iron, Maurer Diagram, malleable cast iron, malleablizing cycle, Grey cast iron, Types of grey cast iron, Nodular cast iron., Alloy cast iron. Microstructure, Properties and Application of each type of cast iron.

Unit IV
Heat Treatment
10 Hrs
a) Introduction, importance of heat treatment, Basic heat treatments such as annealing, normalizing, hardening and tempering, procedure, allied phases - martensite, retained austenite etc related properties, and microstructure and their co-relation. 
TTT diagram, construction, heat treatment based on it. Industrial applications of different heat treatment processes Hardenability, Jominy end quench Test. 
b) Surface Treatments based on above such as Induction Hardening

Unit V
Non-ferrous materials and new generation materials
5 Hrs
Brief introduction to different nonferrous materials and study of the Aluminium and its alloy, eg. Aluminium Silicon, related phase diagram, Na modification Copper and its alloys, eg. Copper-zinc, Copper –tin, Dezincification, Seasons cracking. Introduction to nano materials, high temperature smart materials, properties and relevant applications.

Unit VI
Testing of materials
4 Hrs
Need of testing .Destructive and non destructive testing Mechanical testing, Tensile test, Impact test Izod and Charpy test Hardness measurement, Rockwell , Brinell hardness, micro hardness. Magnetic particle inspection.

Text Books:

Reference Books:
2. Introduction to Engineering Metallurgy, Grewal B.K.;

BMEP203 MATERIALS ENGINEERING
Evaluation Scheme: Practical [2P]
Total Hrs:

list of Practical:
(Any 10 experiments from the following list)
1) Preparation of the specimen for metallographic examination
2) Detailed study of the optical microscope for metallographic examination.
3) Phase identification of equilibrium cooled plain carbon steels
   a) Hypo eutectoid
   b) Eutectoid
   c) Hyper eutectoid
4) Micro structural examination of cast iron
   a) Grey
   b) Malleable
   c) Nodular
5) Property Structural co-relation for basic heat treatment processes for plain carbon steels
   a) Annealing
   b) Normalizing
   c) Hardening
6) Hardenability measurement using Jominy End Quench set up.
7) Hardness measurement and detailed study of Rockwell hardness testing machine.
8) Tensile Testing of Mild Steel using universal Testing machine
9) Impact testing of metallic material using charpy/izod test procedure
10) Phase identification nonferrous materials (Al-si, brass, Bronzes)
11) Study of the SEM used for advanced material characterization.
12) Study of the TEM used for nano material characterization.
13) Study of Non destructive methods for testing of materials.
14) Open ended experiments.

BMEL204 KINEMATICS OF MACHINES (3-1-0-4)
Total Hrs: 42

Pee-requisite: Nil

Course Objectives:
1. To understand basic concepts of different mechanisms and its applications to various fields.
2. To develop competency in graphical and analytical methods in solving problems of quantitative kinematic analysis of mechanism.
3. To make students conversant with Concepts of cam mechanism.
4. To make the students conversant with basic concepts of gears, its applications and torque analysis.
5. To develop analytical competency in designing efficiency of various gears.
6. To make the students conversant with static force analysis and synthesis of mechanism.
7. To give exposure to students the advances in synthesis of mechanism

Course Outcomes:
Upon successful completion of the course, students will be able to-

1. Understand the basics of concepts of different mechanisms.
2. Identify the exact solving problems of quantitative kinematic analysis of mechanism.
3. Develop an appropriate knowledge of mechanism to handle for the mechanical problems, and analyze them, with proper selection of mechanical power transmission system.
4. Understand advanced computing techniques and tools in the area of kinematics of machines. Understand advances in synthesis of mechanism for developing highly efficient machine

Unit I [6 Hrs.]
Basic concept of mechanism, link, kinematic pairs, kinematic chain, mechanism, machine, simple and compound chain, Degree of freedom, estimation of degree of freedom of mechanism by Grubbler’s criterion and other methods. Harding’s notations, classification of four bar chain [class – I & class – II], inversion of four–bar–chain, Kutchbach theory of multiple drives.

Unit II [4Hrs.]
Quantitative kinematic analysis of mechanism :- Displacement, Velocity and Acceleration analysis of planer mechanism by graphical method as well as analytical method [complex number method / matrix method’], Coriolis component of acceleration, Instantaneous center method, Kennedy’s theorem.

Unit III [6Hrs.]
Concepts of cam mechanism, comparison of cam mechanism with linkages. Types of cams and followers and applications. Synthesis of cam for different types of
follower motion like constant velocity, parabolic, SHM, cycloidal etc.

Pressure angle in cam, parameters affecting cam performance.

Unit IV  [10Hrs.]
Concept of motion transmission by toothed wheels, comparison with cams and linkages, various tooth profiles, their advantages and limitations, gear tooth terminologies, concept of conjugate action, law of conjugate action, kinematics of involutes gear tooth pairs during the contact duration, highlighting locus of the point of contact, arc of contact, numbers of pairs of teeth in contact, path of approach and path of recess, interference, undercutting for involutes profile teeth.

Unit V  [10Hrs.]
Kinematics of helical, bevel, spiral, worm gears, rack and pinion gears, kinematic analysis, and torque analysis of simple epicyclic and double epicyclic gear trains.

Unit VI  [6Hrs.]

List of Tutorials

1] Drawing sheets on Inversion of
   i. Class I & Class II four bar cham
   ii. Single slider crank chain
   iii. Double slider crank chain
2] Problems on kinematic analysis
   i. Graphical method
   ii. Analytical method
3] Cam constructions
4] Cams with specified contour
5] Analysis of epicyclic gear train with torque analysis
6] Problems on static force analysis
   i] Linkages
   ii] Cam
   iii] Gear
7] Problems on synthesis
   i] Graphical method
   ii] Analytical method

Recommended Books

1. Shigley J.E., ‘Theory of mechanisms and machines’
2. Ghosh and Malik, ‘Theory of Mechanism and Machine’

Reference Books

2. Sandor and Eradman, ‘Theory of Machines’

BME205 ENGINEERING THERMODYNAMICS
(3-1-0-4) Total Hrs: 42

Pee-requisite:Nil

Course Objectives:

1. Identify the unique vocabulary associated with thermodynamics through the precise definition of basic concepts.
2. To form a sound foundation for the development of the scientific principles.
3. Review the English and the metric SI Unit systems that will be used throughout the text.
4. Explain the basic concepts of thermodynamics such as system, state, state postulate, equilibrium, process, cycle, energy, and various forms of energy.
5. Review concepts of temperature, temperature scales, pressure, and absolute and gage pressure.
6. Introducing basics of ideal and real gases, steam formation, basic laws of thermodynamics, and their applications.
7. Introduce an intuitive systematic problem-solving technique that can be used as a model in solving engineering problems.

Course Outcomes:

1. Apply fundamental concepts of thermodynamics to thermodynamic system.
2. Identify and apply gas laws to various subsystems, processes.
3. Find the process and compute the work involved and heat transfer in the given system.

Unit I  [6 Hrs]
Basic concepts and properties:
Introduction, thermodynamic system, control volume, macroscopic and microscopic approaches, properties and state of a system, point and path functions, thermodynamic equilibrium, processes and cycles, quasi-static process, properties such as specific volume, pressure, temperature, zeroth law of thermodynamics, temperature scales.

Unit II  [7 Hrs]
Ideal gases and vapors:
Difference between gases and vapors, ideal gases, gas laws, equation of state, gas constant, universal gas constant, work and heat, definition of work, thermodynamic work, work in compressible system, work-a path function, work done during various
processes, p-v diagram, definition of heat, heat transfer a path function, comparison of heat and work, Phase change process of a pure substance: specific heats, sensible heat and latent heat, triple point, critical point, superheat and total heat of steam.

Unit III [7 Hrs]
First law of thermodynamics:
Energy of systems, classification of energy, law of conservation of energy, first law applied to closed system undergoing a cycle, Joule experiment, energy-a property of system, internal energy: a function of temperature, enthalpy, specific heat at constant volume and constant pressure, change in internal energy and heat transfer during various non-flow processes. First law applied to flow processes: steady-state steady flow process, mass balance and energy balance in steady flow process, steady flow energy equation and its application to nozzles and diffusers, throttling valve, turbines and compressors, pumps, heat exchangers etc. Work done and heat transfer during steady flow processes.

Unit IV [8 Hrs]
Second law of thermodynamics:
Limitations of first law, heat engines, refrigerators and heat pumps, Kelvin-plank and Clausius statements, their equivalence, reversible and irreversible processes, factors that render processes irreversible, Carnot cycle, perpetual motion machine. Thermodynamic temperature scale, reversed Carnot cycle, COP of heat pump and refrigeration. Entropy: Inequality of Clausius, entropy: a property of system, entropy change for ideal gases, entropy change of a system during irreversible process, lost work, principle of increase of entropy.

Unit V [7 Hrs]
Thermodynamic processes and Power cycles:
Thermodynamic processes: Constant volume, isothermal, adiabatic, polytropic processes, throttling and free expansion- p-v and T-s diagrams-work done, heat exchanged, change in internal energy. Availability and irreversibility: Gas power cycles: Otto cycle, Diesel cycle, semi-Diesel, Sterling cycles, their efficiency and mean effective pressure calculations, Dual cycle, Ericsson cycle.

Unit VI [7 Hrs]
Vapors power cycles:
Properties of steam, specific volume and entropy of steam, dryness fraction of steam, throttling of steam, determination of dryness fraction, steam tables and their use, T-s and H-s diagram, Rankine and modified Rankine cycle, work done and efficiency, specific steam consumption, comparison of Rankine and Carnot cycle, representation on P-v, T-s and h-s diagram.

Text Books Recommended:


Reference Books:
Delivery Methods:
- Class room Teaching
- Power point Presentation
- Experimentation & Component Design

MBL 102 GENERAL PROFICIENCY-II: Foreign Language

For syllabus: please refer electronics engg. Departments syllabus in third semester

IV SEMESTER
BAML207 APPLIED MATHEMATICS - IV (3-1-0-4)
Total Hrs.42

Pee-requisite:
1. BAML 101 Applied Mathematics-I
2. BAML110 Applied Mathematics-II
3. BAML203 Applied Mathematics-III

Course Objectives:
1. To introduce the basic methods of numerical methods and estimation of numerical errors using basic calculus concepts and results.
2. To understand the basics of variational calculus in the form of functional and its application.
3. To understand the basics of probability reasoning and statistic in the field of engineering.
4. To introduce the basic methods of optimization in engineering.

Advance topic on the subject

Course Outcomes
Upon successful completion of the course, students will be able to
1. Apply numerical methods to solve algebraic, simultaneous and ordinary differential equations for approximating solutions in the field of mechanical engineering.
2. Apply variational calculus, random variables, distribution function and bi-variate distribution for the problems in mechanical engineering.
3. Shall be able to formulate model & optimize the solution in the field of mechanical engineering.

Unit I
Numerical methods
[7 Hrs]

Unit II
Numerical method
Eigen values & eigen vector by iteration method, jocobi method, Givens method & Householder’s method, solution of ordinary differential equations by Taylor’s series method, Runge-Kutta fourth order method, Modified Euler method, Milne’s predictor corrector method.

Unit III
Calculus of Variation
Functional, extremals of functions, Variational principle, Euler’s equation, constrained extremals, Hamilton principle & lagrange’s equation in solid mechanics.

Unit IV
Random Variables
Random Variables, Distribution functions of continuous & discrete random variables, Joint distributions, mathematical expectations, moment, Moment generating function & characteristic function.

Unit V
Special probability distribution
Geometric, Bionomial, Poisson’s, normal, Exponential, Uniform, Weibul provability distribution. Random process, esemble average & temporal anerage, Auto correlation & rosscorrelation, stationary random process, power spectrum stationary process & ergodic random process.

Unit VI
Special probability distribution
Introduction to optimization techniques
Linear programming, mathematical model formulation, Solutions by Graphical & Simplex method.

Text Books:
3. S.S.Sastri, ‘Introductory methods of numerical analysis’

Reference Books.
2. Chandrika Prasad, ‘Mathematics for engineers’
3. Chandrika Prasad, ‘Advanced mathematics for engineers’
5. Forrey, ‘Calculus of Variations’

BMEL 207 MECHANICS OF MATERIALS (3-1-0-4)
Total Hrs.42
Pee-requisite: Nil
Course Objectives
1. To teach the fundamentals of simple stresses and strains.
2. To enhance skills in Principal stresses and strains.
3. To imbibe concept of shear force and bending moment with practical exposure and applications.
4. To facilitate the concept of bending and its theoretical analysis.
5. To learn torsion of shaft
6. To study strain energy and impact loading conditions for various applications.
7. To learn and apply statistical methods in determining various factors.

**Course Outcomes**

Upon successful completion of the course, students will be able to

1. The basics of material properties, stress and strain.
2. How to develop shear-moment diagrams of a beam and find the maximum moment/shear and their locations.
3. Stability and buckling phenomena for a slender member under an axial compressive force.
4. The concept of factor of safety and theories of failure.

**Unit I** [8 Hrs.]

Concept of simple stresses and strains: Introduction, stress, strain, types of stresses, stress – strain diagram for brittle and ductile material, elastic limit, Hooks law, modulus of elasticity. Modulus of rigidity, factor of safety, analysis of tapered rod, analysis of composite section, thermal stress and strain, thermal stresses with heat flow in cylinders and plates, Hertz’s contact stresses Longitudinal strain and stress, lateral stresses and strains, Poisson’s ration, volumetric stresses and strain with uni-axial, bi-axial and tri-axial loading, bulk modulus, relation between Young’s modulus and modulus of rigidity, Poisson’s ratio and bulk modulus.

Principal stresses and strains :- Definition of principal planes and principal stresses, analytical method of determining stresses on oblique section when member is subjected to direct stresses in one plan in mutually perpendicular two planes, when member is subjected to shear stress and direct stresses in two mutually perpendicular planes, Mohr’s circle for representation of stresses. Derivation of maximum and minimum principal stresses and maximum shear stresses when the member is subjected to different types of stresses simultaneously (i.e. combined stress).

**Unit II** [8 Hrs.]

Shear force and bending moment: Types of beam (cantilever beam, simply supported beam, overhung beam etc.). Types of loads (Concentrated and UDL), shear force and bending moment diagrams for different types of beams subjected to different types of loads, sign conventions for bending moment and shear force, shear force and bending moment diagrams for beams subjected to couple, Relation between load, shear force and bending moment. Stresses in beams: Pure bending, theory of simple bending with assumptions and expressions for bending stress, derivation of bending equation, bending stresses in symmetrical sections, section modulus for various shapes of beam sections. Shear stresses in beams: Concept, derivation of share stress distribution formula, shear stress distribution diagram for common symmetrical sections, maximum and average shear stress.

**Unit III** [7 Hrs.]

Deflection of beams: Derivation of differential equation of elastic curve with the assumptions made in it. Deflection and slope of cantilever, simply supported, overhung beams subjected to concentrated load UDL, Relation between slope, deflection and radius curvature Macaulay’s method, area moment method to determine deflection of beam.

**Unit IV** [8 Hrs.]

Torsion of circular shafts: Derivation of torsion equation with the assumptions made int. Torsion shear stress induced in the shaft, when it is subjected to torque. Strength and rigidity criteria. For design of shaft. Torque transmitted by solid and hollow circular shaft. Derivation of maximum, minimum principal stresses and maximum shear stress induced in shaft when it is subjected to bending moment, torque and axial load. Column and Struts: Failure of long and short column, slenderness ration, assumptions made in Euler’s column theory, end conditions for column. Expression for crippling load for various end conditions if column. Effective length of column, limitations of Euler’s formula, Rankine formula, Johnson’s parabolic formula.

**Unit V** [5 Hrs.]

Strain energy and impact loading: Definition of strain energy stored in a body when it is subjected to gradually applied load, suddenly applied loads and impact loads. Strain energy stored in bending and torsion. Castigliano’s theorem.

**Unit VI** [6 Hrs.]

Tutorials
1. Two problems on principle stresses
2. Two problems on Mohr’s circle
3. Two problems on Thermal stresses with heat flow
4. Three problems on S.F. & B.M. diagrams
5. Two problems on Stresses in beam bending
6. Two problems on shear stresses
7. Two Problems on Macaulay’s methods
8. Two problems on area moment method
9. Two problems on shafts
10. Two problems on columns and struts
11. Two problems on compound loading
12. Two problems on fatigue and variable loads.

Text Books:
1. Timoshenko, ‘Strength of Materials’
2. F.L. Singer, ‘Strength of Materials’

Reference Book:
1. Shigley, ‘Machine Design’
3. B.D. Shiwalkar, ‘Design Data for Machine elements’

BMEL208 MANUFACTURING PROCESS I (3-0-2-4)

Total Hrs. 42

Pee-requisite: Nil

Course Objectives
1. To develop an insight into metal cutting principles
2. To provide details of the construction of conventional metal cutting machine tools
3. To provide details of manufacturing operations for gears and super finishing processes
4. To enable drawing detail specifications of machine tool for drilling, grinding, milling etc.
5. To select machining parameters for optimum utilization of resources and time for high productivity and dimensional accuracy

Course Outcomes

Upon successful completion of the course, students will be able to
1. Apply numerical methods to solve algebraic, simultaneous and ordinary differential equations for approximating solutions in the field of mechanical engineering.
2. Apply variational calculus, random variables, distribution function and bi-variate distribution for the problems in mechanical engineering.

Shall be able to formulate model & optimize the solution in the field of mechanical engineering

Unit I
Introduction to Machining Parameters: Introduction to machining, tool materials and their properties nomenclature and tools geometry of single point cutting tool, classification, HSS, carbide tool, coated tools, diamond coated tool, coolant materials.

Unit II
Lathe: Introduction, type, construction of simple lathe, mechanism and attachments for various operations, machine specifications, basis for selection of cutting speed, feed and depth of cut, time estimation for turning operations such as facing, step turning, taper turning, threading, knurling.

Unit III
Milling: Introduction, specifications, types, column and knee type milling machine, fixed bed type milling machines, production milling machines, special purpose milling machines such as thread milling machines, profile milling machine, Gear Milling / Hobbing machines. Mechanisms and Attachments for Milling. Cutting parameters, Types of milling operations, Types of milling cutters, Tool geometry and their specifications.

Unit IV
Grinding operations, grinding wheel, specifications and selection, cylindrical and centreless grinding operation, surface grinding, tool and cutter grinding, time estimation for grinding operations.

Unit V

Unit VI

Text Book:


Reference Books
1. Manufacturing Engineering and Technology – S. Kalpakjian and SR Schmid
2. Technology of machine Tools – Krar and Oswald
3. Manufacturing Processes – M Begman
4. Processes and Materials of Manufacture – R. Lindberg
5. Production Technology – HMT
6. Workshop Technology (Volume I & II) – By Bawa

BMEP208 MANUFACTURING PROCESS I Evaluation scheme: Practical [2P]

Total Hours:
Practical

1. Study of single point cutting tool
2. Tools for left hand and right hand turning
3. Tools for external and internal turning (Boring)
4. Study of cutting tool manual (any one)
5. Study of mechanisms in Lathe
6. Study of mechanism in drilling
7. Study of grinding operations
8. Study of mechanism in milling
9. Practical on turning involving facing, step turning, taper turning, boring, boring with internal steps and taper, drilling (on lathe), internal and external threading
10. Practical on grinding
11. Practical on Milling machine – Gear Milling
12. Practical on use of drilling machines.
13. Open ended Practicals.

BMEL 301 DYNAMICS OF MACHINES (3-0-2-4) Total Hrs.42

Pree-requisite:
1. BMEL204 Kinematics of Machine

Course Objectives:

1. To make the students conversant with force analysis
2. To understand gyroscopic principle and its effects in various applications.
3. To develop competency in graphical and analytical methods in solving problems in rotating and reciprocating machineries.
4. To make the students conversant with basic concepts of vibrations, it’s effects and measurement.

Advance topic on the subject

Course Out Comes:

1. To make the students conversant with force analysis
2. To understand gyroscopic principle and its effects in various applications
3. To develop competency in graphical and analytical methods in solving problems in rotating and reciprocating machineries
4. To make the students conversant with basic concepts of vibrations, it’s effects and measurement

Unit I [6 Hrs]

Static Force and Dynamic Force Analysis
Static force Analysis in linkages, Superposition Method, FBD, Equilibrium of four force members, Principal of Virtual Work, D’Alembert’s Principal, Dynamic Analysis of Four Link Mechanism, Engine Force Analysis, Dynamically Equivalent System. Computer aided mechanism design

Unit II [8 Hrs]

Turning Moment Diagram, Flywheel and Gyroscope
Turning moment Vs crank angle diagram for single – cylinder and multiple – cylinder engines, punching machines etc. Flywheel selection.
Simple precession and gyroscopic couple, Gyroscopic effect on airplane, ship, vehicles.

Unit III [8 Hrs]

Balancing of Rotary Masses and Governors
Static and Dynamic balancing of Rotary masses, Balancing of several masses rotating in different planes. Centrifugal and Inertia Governors.

Unit IV [8 Hrs]

Balancing of Reciprocating masses
Partial balancing of locomotive, balancing of primary and secondary forces of Multicylinder In-Line Engine. Crankshaft and associated components, gas forces and inertia forces on crankshaft.

Unit V [8 Hrs]

Longitudinal and Transverse Vibration
Free Vibration, Critical or whirling speed of shaft, free and forced damped vibration, vibration isolation and transmissibility, Vibration Measurement techniques

Unit VI [4 Hrs]

Torsional Vibration
Free Torsional Vibration, mode shape, Single, Two and Three rotor system, Torsionally equivalent shaft, geared system
Text Books
1. Shigley J.E, ‘Theory of mechanisms and machines’

Reference Books:

List of Practical:
1. Determination of gyroscopic couple and sense of direction
2. Determination of jump of cam-follower
3. Dynamic balancing of rotating mass system
4. Dynamic balancing of reciprocating mechanism
5. To determine whirling speed of shaft
6. To determine the time period of a simple pendulum
7. To determine the radius of gyration “k” of a given pendulum
8. To determine the radius of gyration “k” of a given shaft using Bi-filler suspension
9. To determine the frequency of longitudinal vibration
10. To determine the time period and natural frequency of undamped free vibrations of equivalent mass system
11. To determine undamped frequency of forced vibration of equivalent mass system
12. To determine the natural frequency of vibration of single rotor system
13. To determine the natural frequency of vibration of two rotor system
14. To determine the damping coefficient of damped torsional vibration
15. To determine frequency of helical spring

BMEL302 FLUID POWER - II (4-0-2-5)
Total Hrs.46

Pee-requisite:
1. BMEL202 Fluid Power-I

Course Objectives
1. To understand the momentum principle and its application to various fluid machineries
2. To understand the working principles of centrifugal pumps & study the performance characteristic.
3. To understand the basic concepts and applications of CFD

Course Outcomes
Upon successful completion of the course, students will be able to
1. To understand the momentum principle and its application to various fluid machineries.
2. To understand the working principles of centrifugal pumps & study the performance characteristic.
3. To understand the basic concepts and applications of CFD

Unit I
Hydraulic Turbines
Prime Movers: - Theory of impulse and reaction machines. Pelton, Francis and Kaplan turbines, their construction, analysis, characteristics and governing.

Impulse Turbines : Principle, constructional features, Installation of pelton turbine, Design parameters, Performance characteristics and their analysis Main components and constructional features of Kaplan and Francis turbines, Cavitations in water turbines, Governing mechanism, safety devices, Performance characteristics and their analysis, specific speed.

Unit II
Hydraulic Pumps
Centrifugal Pumps: Principles of operation, Classification, basic theory, types, construction, installation, characteristics. and their analysis, Cavitations in pumps,

Reciprocating Pumps : Basic theory, types, construction, installation and characteristics. Classification, working principle, indicator diagram, Air vessels.

Unit III
Pumps
Positive displacement Pumps:
Rotary Pumps: - Basic theory, types, construction and variable delivery pumps.

Rotary Displacement Pumps: Introduction to gear pumps, sliding vane pumps, Screw pumps.

Axial flow pump: - Basic theory, construction, operation, and characteristics

Unit IV
Compressible Flow
Perfect gas relationship, speed of sound wave, mach number, Isothermal and isotropic flows, shock waves, fanno and Rayleigh lines.

Unit V
Hydrostatic and Hydrokinetic systems
Hydrostatic systems, their function, components and application such as Hydraulic press, lift, crane and fluid drive for machine tools. Intensifier and accumulator.

Hydrokinetic systems: Fluid couplings and torque converter.

Unit VI
[7Hrs]
Experimental Testing and Modelling
Model Testing: application to hydraulic turbines and hydrodynamic pumps.
Water Lifting devices, incomplete similarities, Wind tunnel testing, flow with free surfaces.

Text Books:
1. Daugherty and Fanzine, ‘Fluid Mechanics with Engineering Applications’
2. V.P. Vasandani, ‘Hydraulic Machines – Theory and Design’

Reference Book:
1. A.K. Jain, ‘Fluid Mechanics’
2. D.S. Kumar, ‘Fluid mechanics and Fluid Power Engineering’
3. R.K. Bansal, ‘Fluid Mechanics and Machines’
4. AT. Sayers, ‘Theory of Machines’
5. J.J. Pippenger, ‘Industrial Hydraulics’
6. Gadre, ‘Pneumatics’
8. H.L. Stewart, ‘Hydraulics and Pneumatics’

BMEP302 FLUID POWER – II
Evaluation scheme: Practical [2P]
Total Hours :

Practical
(Minimum ten to be performed: six experiments and four study)
1. To verify Bernoulli’s theorem
2. To find the value of coefficient of a given venturi meter fitted in a pipe.
3. To find the value of coefficient of discharge for a given of orifice meter.
4. Performance characteristics of Pelton Wheel.
5. Performance characteristics of Francis Turbine
6. Performance characteristics of Kaplan Turbine
7. Performance characteristics of Reciprocating Pump.
8. Performance characteristics of Variable speed pumps
9. Performance characteristics of Axial flow pumps
10. Study experiment on Fluidic devices
11. Study experiment on CFD
12. Performance of Hydraulic Ram
13. Visit to Hydro Electric Power Plant.

BMEP303 INDUSTRIAL SAFETY PRACTICES & WORK CULTURE (0-0-2-Audit course)

Course Objectives:
1. To enable understanding of the importance of industrial safety
2. To develop personal habits and work culture aimed at minimizing hazards, accidents and waste

Course Outcome:
At the end of the course the student shall be able to:
1. follow industrial safety practices and rules.
2. follow the work culture in industry

Practical per Week: 2 Hrs.

Credits: Audit Course
It is expected to visit the nearby industry and study the industrial safety practices and work culture. Students are required to submit the brief report on the safety practices and work culture in the industry.

MBL103: GENERAL PROFICIENCY-III: Hobby classes
For syllabus : please refer electronics engg. Departments syllabus fourth semester

V SEMESTER

BMEL 304 MACHINE DESIGN – I (3-1-0-4)
Total Hrs. 42

Pee-requisite: 1. BMEL207 Mechanics of Material

Course Objectives:
1. To make students conversant with fundamental aspect of design.
2. To develop competency in designing various components of various joints.
3. To develop competency in designing a system involving the various component, as a design project in practical.
4. To develop analytical skills in designing various drives.
5. To make students conversant with tools for designing pressure vessel.
6. To give exposure of designing of transmission shafts.
Course Outcomes:
Upon successful completion of the course, students will be able to understand designing of machine components namely,

1. The riveted, bolt
2. ED and knuckle and pin joints.
4. The Pressure vessels.
5. The transmission shafts.

UNIT I: (5Hrs.)
Definition of design, types of design, design process, need, defining the problem, feasibility, preliminary, design alternatives, final design selection, preliminary and final plans & drawings. Failure criterion and manufacturing considerations in design, basis of good design, failure of machine parts, deformations, wear, corrosion, manufacturing methods, machining tolerance, surface finish, cost design consideration in casting and forging.

Mechanical Properties, applications and designations as per ISI and their equivalence with other standards of engineering materials, selection of materials, temperature effects on properties of materials such as cast Iron, plane carbon steel, alloy steels, aluminum and copper alloys, cast steel, plastics, polymers and composites and their applications. Introduction to fracture mechanics: modes of fracture, stress intensity factors, crack propagation. Paris law, creep phenomenon, design for creep.

UNIT II: (8Hrs.)
Design of Cotter and Knuckle Joint, shrink and press fit joints. Riveted Joint : Riveted joint for boilers, structural works (Uniform Strength Joint), and eccentric loaded riveted Joint. Welded Joint : Design of single transverse, double transverse, parallel fillet, combination fillet butt joint, eccentrically loaded welded joints. Bolted Joint ; Design of bolted fasteners, bolts of uniform strength, bolted joints under eccentric loading design of lever : hand lever, foot lever, and bell crank lever.

UNIT III: (6Hrs.)
Design of Power Screw: Derivation of expression for deflection and shear stress in helical spring, Design of helical spring, design of leaf spring.

UNIT IV: (8Hrs.)
Kinematics of Friction Drives such as brakes, clutches, design of friction clutch, single plate, multiple plate, cone, centrifugal clutch, design of brake, shoe brake, band brake, internal expanding brake.

UNIT V: (7 Hrs.)
Classification of thin and thick cylindrical pressure vessel, stresses in thin and thick cylindrical pressure vessels. ASME code of pressure vessel and piping. When It Is subjected to internal pressure, Expression for circumferential and longitudinal stresses, design of pressure vessel, heads and cover Plate.

UNIT VI: (8Hrs.)
Design of transmission shafts on the basis of strength, rigidity and critical speed, ASME code for shaft design, design of stepped shaft axe splined shaft, keys.

Advanced topic in the subject
Text Books :

Reference Books :

BMEL 209 COMPUTER APPLICATIONS IN MECHANICAL ENGINEERING (3-0-2-4)
Total Hrs. 45
Pee-requisite:
1. BITL104 Basic of computing

Course Objectives:
1. To teach the fundamentals of algorithms.
2. To develop theoretical foundations and appropriate use of data structures.
3. To enhance skills in statistical techniques in DBMS and to Understand data base management and their models.
4. To provide hands on experience on various models of data and their operators.
5. To inculcate knowledge of constraints and design.

Advanced topic in the subject
Course Outcomes:
1. The basics of algorithm, flowchart data, data type and primitive operations.
2. Composite data structures. Arrays and vector sorting algorithms.
3. The basics of non-linear data structures, trees, general trees and their searching techniques.

4. Students shall be able to make use of object modeling — basics of oops, with relation to modeling of objects

Unit I (8 Hrs)
Introduction to algorithm, expressing algorithm, narrative description, flowchart, an algorithm language. data, data types and primitive operations, variables and expressions from algorithm to program, decision structures, sub algorithms.

Unit II (7 Hrs)
Composite data structures, arrays and vector sorting algorithms. 1-2 dimensions.

Unit III (7 Hrs)
Linear data structures, linked list, stacks, queues, recursion non-linear data structures, trees, general trees and their searching techniques.

Unit IV (8 Hrs)
An introduction to DBMS: data and database systems concepts and meaning. disadvantages of file systems advantages of database approach disadvantages of using DBMS, database languages, database administrator & user, system structure, computer network networking, topologies, protocols, network model, internet & E-commerce B – B.

Unit V (7 Hrs)
Entity relationship model entities and entity sets, relationship and relationship sets, mapping constraints, keys, entity relationship diagram, reducing E-R diagrams to table, generalization, aggregation, design of an E-R database scheme. relational database & SQL: structure of relational database, relational algebra. basic structure of SQL, set operations, aggregate, functions, nested sub queries, derives relations.

Unit VI (8 Hrs)
Integrity constraints & relational database design: domain constraints, referential integrity, functional dependencies, assertions, triggers, pitfalls, in relational database, normalization using functional dependencies, using multi-valued dependencies, domain key normal form. indexing and hashing basic concepts, indexing B+ tree index files, B – tree , index files, static hashing.

Text Books

Reference Books

Tutorials
Programming in C/C++/SQL or any other suitable package based on above syllabus.

BMEL 309 COMPUTER APPLICATIONS IN MECHANICAL ENGINEERING

Evaluation Scheme: Practical [2P]
1. Algorithm and Program Development Programs are expected in any suitable language preferably C.
2. Programming using simple numerical computation, simple, compound & nested if-else statements
3. Programming using simple & nested looping (for, while loops)
4. Programming using Arrays
5. Programming using Sorting Techniques, Searching Techniques
6. Use of SQL for creation and modification of table.
7. Use of SQL for creation of table with constraints.
8. Use of SQL for insertion of data in the table.
9. Use of SQL or single table retrieval.
10. Use of SQL having & group by clause.
11. Use of SQL joins and correlations.
12. Use of SQL set functions, concatenation.
13. Use of SQL nested queries.
14. Study of indexing and hashing.
15. Study of various network topologies.
16. Open ended practicals

BMEL 305 MECHANICAL MEASUREMENTS (4-0-2-5)
Total Hrs. 48
Pee-requisite: Nil

Course Objectives:
1. To understand the basic concept of measurement system and functional elements of measurement system
2. To understand the performance characteristics of measuring instruments
3. To understand various measuring instruments for strain measurement, pressure measurements,
4. To understand the data acquisition system and its application

Course Outcomes:
1. To understand the basic concept of measurement system and functional elements of measurement system.
2. To understand the performance characteristics of measuring instruments
3. Students should be able to make use of various measuring instruments.
4. Students should be able to know about the data acquisition system and its application.

Unit I (9 Hrs)
2. General configuration and functional elements of measuring instruments, types of inputs, various methods of correction for interfering and modifying inputs.

Unit II (8 Hrs)
General performance Characteristics:
1. Static characteristics, different types of errors, combination of component errors in overall systems.
2. Dynamic characteristics: General mathematical model of zero order, first order and second order instruments, response of first and second order instruments to following inputs step, ramp, impulse and frequency.

Unit III (8 Hrs)
1. Strain Measurement
Types of strain gauges, strain gauge circuits, calibration, Temperature compensation, use of strain gauges on rotating shafts, selection and installation of strain gauges.
2. Pressure Measurements:
Basic methods of pressure measurement, dead weight gauges and manometers, elastic transducers and force balance transducers, strain gauge pressure cell, High pressure measurement Bridgeman type, low pressure measurement - Mcleod, Krudsen, ionization, Thermal conductivity gauges.

Unit IV (7 Hrs)
1. Force, torque and shaft power measurement
Force measurement using transducer (pneumatic and hydraulic load cells, strain gauge load cells, piezoelectric load cells), torque measurement on rotating shaft, electrical type dynamometer.
2. Motion measurements
Measurements of displacement, velocity & accelerate strain gauges, LVDT, capacitive, photoelectric & Inductive transducers, encoder.
3. Flow Measurements: Construction- Venturi, orifice, Dall tube, rotameter, Pressure probes- Pitot static tube, yaw tube anemometer, positive displacement flow meters, turbine meter, electro-magnetic flow meter.

Unit V (8 Hrs)
1. Temperature measurement
Measurement of temperature using Liquid in glass thermometer, pressure thermometers, thermocouples, resistance thermometers, bimetallic thermometers, thermistors, radiation and optical pyrometer.

Unit VI (8 Hrs)
1. Speed Measurements:
Various mechanical type tachometers, electrical type tachometers, stroboscope etc.
2. Other Measurements:
Vibration Measurements, Humidity measurement, liquid level Measurements.
Advanced topic

Text Books :

Reference Books :

BM EP 305 MECHANICAL MEASUREMENTS

Evaluation Scheme: Practical [2P]

LIST PRACTICALS: - At least of eight practical from the following list.
1. Measurement of strain using strain gauges.
2. Calibration of pressure gauge with pressure gauge tester.
4. Performance of capacitance transducer as an angular displacement measuring device.
5. Performance of inductive Transducers.
6. Speed measurement by magnetic pick up.
7. Pressure measurement by strains gauge type transducer.
8. Vacuum measurement using McLeod gauge.
9. Temperature measurement. Using RTD, Thermistors
10. Open ended practicals

BMEL 306 MANUFACTURING PROCESS II (3-0-2-4)
Total Hrs.42

Pee-requisite:
1. BMEL208 MANUFACTURING PROCESS I

Course Objectives:
1. To understand basic material properties for bulk material shaping
2. To provide basic principles of metal flow and design considerations for manufacturing sand casting
3. To provide details of different joining processes for large scale manufacturing
4. To enable understanding basic concept and principles of rolling forging and sheet metal working
5. To use state of the art newer technologies including powder metallurgy as well as plastic as widely accepted new age material for mass production

Advanced topics on the subject.

Course Outcomes:
Upon successful completion of the course,

1. Apply basic knowledge related to foundry and casting design.
2. Understand the basics of manufacturing processes such as forging, rolling, extrusion, wire drawing techniques and powder metallurgy.
3. Select appropriate joining processes in industries for joining different materials, understand defects and select inspection techniques
4. Understand applications and processing of plastics for developing different

Unit I  (8 Hrs.)
Casting process: introduction, pattern making: types, materials used, pattern making allowances, colour codes core making: - types, core material and its properties. recent development in pattern making
Molding: types of sand moulds, molding sand composition, molding sand properties, molding machines.

Unit II  (8 Hrs.)
Gating design – elements of gating systems, pouring time, riser design melting furnaces – types, electric furnace, induction furnace, Cupola – construction and operation, cleaning, inspection and casting defects. recent trends in melting.
Foundry mechanization : special casting processes such as investment casting, centrifugal casting, shell molding, co molding, slush casting, die casting.
automation in foundry operations.

Unit III  (7 Hrs.)
Forming processes, advantages and drawbacks. rolling, forging, extrusion , wire drawing, embossing. etc

Unit IV  (6 Hrs.)
Powder metallurgy : powder manufacture and conditioning, production of sintered structural components. self lubricating bearing. cemented carbides, ceramics, sintered carbide cutting tools.
Composite materials : classification, different types of composite materials and its applications.

Unit V  (7 Hrs.)
Joining processes : introduction to welding, soldering, brazing processes. types of welding. arc welding and gas welding processes, defects and inspection of welding joints, electrodes, weldability of metals, welding equipments of fixtures.

Unit VI  (6 Hrs.)
Processing of plastics, thermoplastic, thermosetting plastics, general properties and applications of thermosetting and thermo plastics.
general plastic processes: extrusion, injection moulding, compression moulding, transfer moulding blow moulding, calendaring.

Text Books:
Reference Books

2. M Begman, ‘Manufacturing Processes’

BMEL 306 MANUFACTURING PROCESS II

Evaluation Scheme: Practical [2P]

List of Practicals

1. Practical on Molding
2. Simulation Practical on Casting – I
3. Simulation Practical on Casting – II
4. Study of Mechanization in Foundry
5. Study in Sintering operation
6. Practical on Welding, Soldering & Brazing Processes
7. Practical on Arc Welding
8. Practical on Gas Welding
9. Open ended practicals

BMEL 210 ENERGY CONVERSION – I (3-1-0-4)

Total Hrs. 42

Pee-requisite:

1. BMEL 205 Engineering Thermodynamics
2. BMEL 202 Fluid Power I
3. BMEL 302 Fluid Power II

Course Objectives:

1. To apply fundamentals of Engineering Thermodynamics with relevance to steam turbines, steam nozzles, boilers and condensers
2. To learn the concept of steam generation
3. To study the performance of cooling towers, coal handling systems

Course Outcomes:
Students shall be able to

1. Understand the basic concept of power generation system and its elements
2. Understand the criteria of performance & working of power plants

3. Understand different techniques of power generation to design economic power

Unit I (8 Hrs)

Principles of Steam Generation, Classification of Steam Generators, Fire Tube And Water Tube Steam Generators, High Pressure Steam Generators. Boiler Mounting and Accessories.

Unit II (6 Hrs)

Draught And Its Classification, Chimney Height, Chimney Diameter, Efficiency, condition For Maximum Discharge. Performance of Steam Generators. Evaporation Capacity, Equivalent Evaporation, Boiler Efficiency.

Unit III (7 Hrs)


Unit IV (8 Hrs)


Unit V (7 Hrs)

Energy Losses In Steam Turbines, Flow Of Steam Through Turbine Blades, Ideal And Actual Reheat Factors, Velocity Diagrams, Graphical And Analytical Methods, Work Done, Thrust And Power, Dimensions And Proportioning Of The Blades, Steam Turbine Efficiencies, Condition For Maximum Efficiencies, Reheat And Regenerative Cycles, Governing Of Steam Turbines

Unit VI (6 Hrs)


Text Books:

1) Thermal Engineering by P.L. Ballaney

Reference Books:

1. Thermal Engineering by Vasaudani & Kumar
2. Power Plant Engineering by V.M. Domkundwar

BMEP 307 INDUSTRIAL CASE STUDY (0-0-2-2)

Course Objectives:
1. To enable developing abilities of team work to find solution to real life problems in industry
2. To develop ability of systematically collecting data and it’s analysis through brainstorming
3. To develop ability of decision making based on systematic qualitative and quantitative data analysis techniques
4. To provide exposure to real life engineering problems and solve them in holistic manner

Practical per Week : 2 Hrs.
Industrial case study should be based on the study of some specific case/issue/problem related to any industrial/business establishment. Data should be collected from industry with the objective of studying some specific case/issue/problem. The collected data should be analyzed using one or more theories studied in the curriculum. The results should be worked out and conclusions should be drawn. A group of maximum nine students should be formed for one case study.

A report should be submitted. The report should consist of the problem/issue identified methodology of data collection, data collected, and method of analysis, result and conclusion. Minimum two presentations should be made.

MBL104: GENERAL PROFICIENCY-IV (Advanced Communication Skill)

For syllabus : please refer electronics engg. Departments syllabus in fifth semester

VI SEMESTER

ELECTIVE – I

BMEL307 POWER PLANT ENGINEERING (3-0-0-3) Total Hrs.42

Pree-requisite: 1. BMEL210 Energy Conversion-I

Course Objectives
- To study the economics of power generation
- To study various methods of power generation
- To study performance of various power plants

Advance topic on the subject

Course Outcomes
1. Understand the basic concept of power generation system and its elements
2. Understand the criteria of performance & working of power plants
Understand different techniques of power generation to design economic power

Unit I

Nuclear Power Generation

Unit II

Hydroelectric Power Plant
Hydrology : Rainfall , Runoff, Hydrograph , flow duration curve , mass curve. Hydroelectric power plant : Site selection ,classification of hydroelectric power plant, general arrangement, details of different components prime movers, governing, model & model testing advantages, comparison with other power plant.

Unit III

Steam Power Plant
Introduction: Coal – its properties, handling & storage, fuel firing methods ash & dust handling boiler accessories, high pressure boiler, draught system, steam turbine, condenser, cooling towers. Water treatment, steam pipes, power plant layouts, pollution from steam power plant.

Unit IV

Gas Turbine Power Plant
Introduction, classification, various components, different arrangement, governing, methods to improve efficiency, comparison with other power plant. Diesel Electric Power Plant: Introduction, Outline, type of engines, different components, performance, plant layout comparison with other power plant. Introduction to unconventional power sources – Solar, wind, Tidal, geothermal, MHD.

Unit V

Peak load plants, waste heat recovery system, various energy storage – systems like pumped hydro,
compressed air. Flywheel, battery storage, thermal sensible & latent heat storage, chemical energy storage. Automation & Instrumentation: Measurement of water quality, O2, CO2 measurement, gas analysis, smoke & dust measurement, moisture measurement, nuclear measurement.

**Unit VI** [7 Hrs]
Fluctuating Load: Load curves, various terms & definition, effect of fluctuating load.
Economic Analysis: Tariffs, load division, and cost of electric energy.
Combined Operation: Need, division, combination of different plant & their coordination, advantages.

**Text Book**
1. Domkundwar ‘Power Plant Engineering’ Dhanpat Rai Publication, New Delhi

**Reference Books**
1. Vopal & Slortzki, ‘Power Plant Engineering’
2. P.K. Nag, ‘Power Plant Engineering’

**ELECTIVE – I**

**BMEL308: DESIGN OF MECHANICAL DRIVES (3-0-0-3)**

**ELECTIVE-I**
**Total Hrs: 42**

**Course Objectives:**
1. To understand selection & design of belts & pulleys
2. To understand the analysis of gear train.
3. To make the student conversant with design of gear box, clutches & brakes

**Course Outcomes:**
1. To develop competency in understanding selection & design of belt & pulley
2. The student will understand torque transmitting capacity in gear trains which will be the prerequisite for gear box design.
3. Students will be able to select appropriate procedure for designing of gear box, clutches & brakes

**Unit I: DESIGN OF MECHANICAL DRIVES FOR (8 Hrs) FLEXIBLE ELEMENTS**
Selection of V belts and pulleys – Selection of Flat belts and pulleys - Wire ropes and pulleys – Selection of Transmission chains and Sprockets. Design of pulleys and sprockets.

**Unit II: SPUR GEARS AND PARALLEL AXIS (8 Hrs) HELICAL GEARS**

**Text Books:**

**Reference Books:**
BMEL309 ARTIFICIAL INTELLIGENCE (3-0-0-3)

Total Hrs.42

Pee-requisite:
1. BITL 104 Basic of computing
2. BECL105 Basic electronics

Course Objectives

1. To understand the artificial Intelligence in the environment of mechanical engineering
2. To understand the Artificial intelligence first order logic and concepts in knowledge engineering
3. To provide exposure to information extraction and machine translation

Advance topic on the subject

Course Outcomes:

1. Describe the key components in the artificial intelligence (AI) field
2. Use mini max search and alpha-beta pruning techniques
3. Apply probability theorem, Bayesian network and key aspects of intelligent agents

Unit I Introduction (8Hrs)

Unit II Searching Techniques (9Hrs)

Unit III Knowledge Representation (10Hrs)
First order logic – representation revisited – syntax and semantics for first order logic – using first order logic – knowledge engineering in first order logic - inference in first order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - resolution - knowledge representation - ontological engineering - categories and objects – actions - simulation and events - mental events and mentalobjects

Unit IV Learning (8Hrs)

Unit V Applications (7Hrs)

Text


References


For more details, visit www.annauniv.edu/academics/index.html/

Elective - I

BMEL 310 QUALITY AND RELIABILITY ENGINEERING (3-0-0-3)

Total Hrs.43

Pee-requisite: Nil

Course Objectives

1. To study the significance and meaning of quality.
2. To study different quality control tools i.e various charts.
3. To study various sampling techniques used in industries.
4. To study product life cycle in industries.

Course Outcomes
1. Understand the importance and principles of managing quality in the changing business environment
2. Understand process variability and statistical concepts of quality control
3. Apply SQC principles and use control charts and design of experiments for variables

**Unit I Introduction to Quality** [7 Hrs]
Quality - the changing business condition. significance and meaning of quality, quality function, definition of SQC, benefits and limitation of SQC, brief discussion on quality of design, quality of manufacturing and quality assurance, quality cost.

**Unit II Process Control for Variables** [8Hrs]
Variation in process- factors – process capability – process capability studies and simple problems – Normality and Histogram, theory of control chart- uses of control chart – control chart for variables – X chart, R chart, design of experiments, Taguchi method, orthogonal arrays.

**Unit III Process Control For Attributes** [7 Hrs]
Control chart for attributes – control chart for proportion or fraction defectives – P chart and NP chart – control chart for defects – C and U charts, state of control and process out of control identification in charts.

**Unit IV Acceptance Sampling** [8Hrs]
Lot by lot sampling – types – probability of acceptance in single, double, multiple sampling techniques – O.C. curves – producer’s risk and consumer’s risk. AQL, LTPD, AOQL concepts-standard sampling plans for AQL and LTPD- uses of standard sampling plans.

**Unit V Life Testing - Reliability** [7 Hrs]
Life testing – objective – failure data analysis, mean failure rate, mean time to failure, mean time between failure, hazard rate, system reliability, series, parallel and mixed configuration – simple problems, maintainability and availability – simple problems, acceptance sampling based on reliability test – O.C Curves.

**Unit VI Quality and Reliability** [6 Hrs]

Advance topic on the subject
Note : Use of approved statistical table permitted in the examination.

**Text**

**Books:**

**References:**

**ELECTIVE-I BMEL 311 MECHANICAL VIBRATION** (3-0-0-3) Total Hrs.41

Pee-requisite:
1. BAML 101 Applied Mathematics-I
2. BAML110 Applied Mathematics-II
3. BAML203 Applied Mathematics-III
4. BAML207 Applied Mathematics-IV

**Course Objectives**

1. To understand basic concepts of mechanical vibrations.
2. To develop competency in analytical methods in solving problems of vibrations.
3. To make students conversant with Concepts of Degrees of freedom.
4. To make the students conversant with basic concepts of Rotor dynamics.
5. To make the students conversant with various techniques of vibration measurement and to give exposure to students the advances in vibration measurement.

Advance topic on the subject

**Course Outcomes:** Upon successful completion of the course, students will be able to

1. Student will able to study of various mode like transmissibility, vibration isolation Shock mounting
2. Student will study of balancing of balancing of rotor, also dynamic behavior of rotary machine by the help of various vibration measurement technique
3. Student will study of wave propagation in continuously rotary system by the help of FFT analyzer. Also study of spectrum in heavy loaded machinery.
4. Student should aware proper utilization of various vibration measurement devices like vibration pick up, piezoelectric pickups, etc.

Unit I
(2Hrs)
Introduction
Need & scope, concepts & terms used, SHM, method of representing vibration, Fourier series & harmonic analysis.

Unit II
(7Hrs)
Single DOF system
(a) Damped free vibrations, types of damping, logarithmic decrement, coulomb damping, and damping materials.
(b) Forced Vibrations: types of excitation, forced excitation, support excitation, excitation due to unbalance in machines, response due to above types of excitations, transmissibility, force transmissibility & motion transmissibility, vibration isolators, commercial isolation materials & shock mounts.

Unit III
(7Hrs)
Two DOF system:
(a) Free un-damped vibrations – principal modes and natural frequencies, co-ordinate coupling and principal co-ordinates.
(b) Forced Vibrations (undamped) – harmonic excitation, vibration, dampers & absorbers, dynamic vibration absorber – tuned & untuned type

Unit IV
(8Hrs)
Multi DOF systems
Close couple systems, far coupled systems, orthogonality of mode shapes, modal analysis, forced vibration

Unit V
(8Hrs)
Rotor Dynamics
Single mass system- torsional vibration in rotary machinery, two mass system, multi mass system, balancing of rotor, dynamic behavior of rotor, gyroscopic effects.

Unit VI
(9Hrs)
Conditioning Monitoring
Vibration instrumentation- displacement, velocity, acceleration, shock measurement, transducer, terminal devices spectrum analyzer, exciter, special mounting techniques signature analyzer, concept of signature and prediction of trouble by signature monitoring
Vibration Measurements- vibration pick ups, accelerometers; inductance and capacitance type pick ups, piezoelectric pickups; exciters, vibration meter, FFT analyzer, fault detection based on vibration.

Text Book:-


Reference Books’

ELECTIVE-I
BMEL 312 ADVANCE I. C. ENGINES (3-0-0-3)

Pee-requisite:
1. BMEL205 Engineering Thermodynamics
2. BMEL 210 Energy Conversion-I

Total Hrs. 42

Course Objectives
1. Identify the unique vocabulary associated with Engines through the precise definition of basic concepts to form a sound foundation for the development of the scientific principles to follow and to prevent possible misunderstandings.
2. To explain the principles of operation, the different classifications, and the measurements and performance standards of an internal combustion engine.
3. To introduce Combustion phenomenon in I.C.Engines
4. Making awareness about exhaust emissions, their controlling methods and environmental hazards

Advance topic on the subject

Course Outcomes: Upon successful completion of the course, students will be able to

1. Students will be able to understand the operating characteristics of different engine types and designs
2. Students will be able to predict performance and fuel economy trends with good accuracy for given engine specifications
3. Students will have good exposure to the IC engine systems needed to set-up and run engines in controlled laboratory environments.

Unit I [7 Hrs]

Unit II [7 Hrs]

Unit III [8 Hrs]
Determination of IP, BP, FP, Mean effective pressure, Fuel consumption, Air Consumption, Engine efficiencies, Performance characteristics, Energy balance.

Unit IV [7 Hrs]

Unit V [7 Hrs]
Diesel Injection : Mechanical injection system, classification of injection system, fuel feed pump, injection pump, governors, Fuel nozzles, electronic injection system, electronic fuel injection system (EFI), multi point fuel injection, (MPFI), Electronic control system.

Unit VI [6 Hrs]
Air pollution due to I.C. Engines, Emissions, Euro norms, Emission control methods, Catalytic converters. EGR system, Diesel Particulate Filter, effect of design and operating parameters on IC engine emission. Catalyst, Alternative fuels, Methanol, Ethanol, vegetable oils, biogas, comparison of their properties with diesel and petrol

Text Books:
2. Edward E. Obert, “Internal Combustion Engines and Air Pollution”, Internal Educational Pub, 1973

Reference Books:
1. I.C. Engine, V Ganesan, Tata McGraw publication

BMEL-313 ENERGY CONVERSION – II (3-1-2-5)
Total Hrs.42

Pee-requisite:
1. BMEL 210 Energy Conversion-I

Course Objectives
1. To study various power generation equipments
2. To learn the concept of compressors, I.C.Engines, gas turbines
3. To learn the various methods of performance analysis of I.C. Engine, Gas Turbine

Advance topic on the subject

Course Outcomes:
1. Demonstrate performance characteristics of various energy conversion devices
2. Set up and conduct experiments on various tests set up, analyze and interpret data and present the results
3. Understand various power generation devices

Unit I [7 Hrs.]
Positive displacement Compressors.
Reciprocating compressors: Parts, Operations, Work done during isothermal, polytropic and adiabatic compression process, PV diagram, isothermal efficiency, Effect of clearance, volumetric efficiency, Mechanical efficiency, Multistage compressor, condition for minimum work input, capacity control, Actual indicator diagram.

Unit II [7 Hrs.]
Rotary Compressors: Principle, operation, parts, indicator diagram, work done, Rodts efficiency, vanes efficiency. (No analytical treatment expected)
Centrifugal Compressor: Principle, operation, parts, velocity diagram, work done, Degree of reaction stage efficiency compressor characteristics, surgin & choking. Polytropic efficiency.

Unit III [7 Hrs.]
I.C. Engines: Air standard & fuel air cycles, parts of I.C. Engines, working of I.C. Engines, Two stroke and four stroke I.C. Engines SI & CI Engines, Introduction to
combustion in SI & CI Engine, carburetion and fuel injection. (Analytical treatment not expected)

**Unit IV**
[6 Hrs.]
I.C. Engine Testing:
Measurement of power: Indicated, friction and brake power, measurement of speed, fuel land air consumption, calculation of indicated and brake thermal efficiency, volumetric efficiency, mechanical efficiency, percentage of excess air, Heat balance sheet, performance, characteristics and factors influencing the performance of I.C. Engines.

**Unit V**
[6 Hrs.]
Gas Turbines and Jet propulsion
Ideal cycles isentropic and small stage efficiency, application of gas turbine pressure losses, effect of inter-cooling, reheat and regeneration, fuel – air ratio, combustion efficiency performance calculation, open cycle and closed cycle gas turbine plants co-generations and combined power cycles. Principles and working of turbojet, turboprop, Ramjet and pulse jet simple turbojet cycle, Thrust power, propulsive power. Thermal efficiency propulsive efficiency, overall efficiency.

**Unit VI**
[9 Hrs.]
Refrigeration and Air-conditioning
Introduction, capacity of refrigerating Unit, refrigeration methods, vapours refrigeration cycle, vapours compression refrigeration cycle, selection of refrigerant, vapour absorption cycle, Electrolux refrigerator, dry air, moist air and saturated air, specific humidity, reparative humidity

**Text Books:**
2. R.Yadav, ‘Thermal Engineering’

**Reference Books’**
1. Kumar and Vasandani, ‘Heat Power Engineering’
2. V. Ganeshan, ‘Internal Combustion Engine’
   Tata McGraw publication
4. Cohen and Rogers, ‘Gas Turbine Theory’

**BMEL314 MACHINE DESIGN – II (3-0-2-4)**
Total Hrs. 46

Pee-requisite:
1. BMEL304 Machine Design I

**Course Objectives**
1. To develop competency in designing couplings, flywheel.
2. To develop competency in designing bearings.
3. To develop statistical skills in designing various drives.
4. To make students conversant with tools for designing gear drive.
5. To give exposure to haulage system.

Advance topic on the subject

**Course Outcomes:**
1. Apply the basics of design of mechanical components and their applications
2. Students will be able to understand drive system, gear terminology and bearing design
3. Understand the principles and design aspects of flywheel and coupling design for manufacturing

**Unit I**
(7 Hrs.)
Coupling : types of shaft coupling, design of flange coupling, flexible bush coupling.
Flywheel : coefficient of fluctuation of energy and coefficient of fluctuation of speed, energy store in flywheel, stresses in flywheel, design of flywheel.

**Unit II**
(7 Hrs.)
Surface finish, friction wear, lubrication, oil seals, design of journal bearings for radial and thrust loads, selection of ball and roller bearing for radial and thrust loads, failures of antifriction bearing, design of hydrostatic pocket type thrust bearing such as circular step thrust bearing, bearing housing.

Unit III
(8Hrs.)
Flat belt drive: types of belts and belt material, analysis of belt tension, condition for transmitting maximum power, design of flat belt, flat belt pulley.
V belt drive: types of V-belt, analysis of V-belt tension, design of V belt pulley,
Roller change drive: velocity ratio and length of chain, design of chain, dimensions of tooth profile, sprocket.

Unit IV
(8Hrs.)
Review of kinematics of gears and terminology, interference, tooth profiles, formative number of teeth etc. Buckingham equation, design of spur gear drive, helical gear drive, hypoid gear, spiral gear

Unit V
(8Hrs.)
Worm gear drive: types and proportion of worm and worm gear, force analysis, beam strength of worm gear teeth, dynamic tooth load, wear load, thermal rating of worm gear, design of worm and worm gear.
Bevel gear drive: types of bevel gear, proportions of bevel gear, force analysis of bevel gear drive design of bevel gear drive.

Unit VI
(8Hrs.)
Introduction to haulage system, design of wire rope, sheave and drums, electric motor rating, types of motor like AC, DC, their characteristics, controls, selection motors.

Text Books:

Reference Books:

BMEL 314 MACHINE DESIGN – II
Evaluation scheme: Practical [2P]
Total Hours:
List of Practical:
Numerical problem (at least 10 problems should be included in the journal)
1. Design of fly wheel
2. Design of coupling
3. Design of Journal Bearing
4. Design of Selection Antifriction bearing
5. Design of Belt drive
6. Design of chain drive
7. Design of wire rope
8. Design of Gear drive
10. Design of Camshaft.
Each students shall submit two assembly design report along with the drawing for assembly / sub assembly for any mechanical system consisting of not less than four members included in the syllabus.

BMEL 315 HEAT TRANSFER (4-0-2-5)
Total Hrs.55
Pee-requisite:
1. BMEL205 Engineering Thermodynamics

Course Objectives:
1. To provide a general knowledge on the basic mechanisms of heat transfer
2. Make the right assumptions and approximations for tackling practical situations
3. To develop intellectual skills of providing analytical solutions to variety of real life situation involving heat transfer.
4. Exploring the advanced career opportunities in the area of heat transfer like Design of heat exchangers, heat transfer augmentation methods, Thermal analysis etc.

Advance topic on the subject

Course Outcomes:
1. Identify the exact mode of heat transfer involved in the process.
2. Develop mathematical formulation for various heat transfer problems in process industry such as heat exchangers.
3. Use advanced computing techniques in system modeling.

Unit I (10Hrs)

Unit II (9 Hrs)

Unit III (9 Hrs)

Unit IV (9Hrs)

Unit V (9 Hrs)

Unit VI (9 Hrs)

Text Books:

Reference Books

BMEP 315 HEAT TRANSFER
Evaluation scheme: Practical [2P]
Total Hours:
List of Practical

1) Determination of thermal conductivity and total thermal resistance of composite wall.
2) Determination of thermal conductivity of metal rod.
3) Determination of emissivity of non – black surface.
4) Determination of thermal conductivity of an insulating material in powder form.
5) Determination of temperature distribution and heat transfer rate from a fin under A) Free Convection B) Forced Convection Conditions
6) Determination of free convection heat transfer coefficient for air flow over a vertical surface.
7) To determine heat transfer coefficient in agitated vessel & its comparison with Non agitated situation
8) To study temperature history of specimen with respect to time and its comparison with lumped capacitance theory.
9) To find out the heat flow rate & rate heat transfer coefficient of water for Shell & Tube Heat exchanger.
10) To find out temperature distribution heat transfer rate overall heat transfer coefficient effectiveness of parallel & counter flow heat exchanger.
11) To find out heat transfer rate overall heat transfer coefficient & effectiveness and cross flow heat exchanger.
12) To find out temperature distribution heat transfer coefficient & effectiveness of plate type heat exchanger.
13) To determine heat flow rate through lagged pipe & thermal conductivity of lagging material through lagged pipe.
14) Determine of forced convection heat transfer heat transfer coefficient for air over a surface.

**BMEL316 INDUSTRIAL ENGINEERING (3-1-0-4)**

**Total Hrs.42**

**Pee-requisite: Nil**

**Course Objectives**

1. To understand various concepts in Industrial Engineering.
2. To understand basic concept of work study and method study.
3. To learn various work measurement techniques.
4. To study principles and characteristics of organisation.
5. To understand human factors consideration in system design.
6. To learn sales forecasting, production planning and control, inventory control.
7. To study the process of product design and development.

**Advance topic on the subject**

**Course Outcomes:**

1. To understand the concepts of productivity and quality in the changing business environment.
2. To understand methods study and need of motion economy and apply work measurement techniques and time study procedures.
3. To know principles of organization and different types of organization structures.

**Unit I Introduction**

(7 Hrs)

Introduction to Industrial Engineering, concept of productivity, work study: Introduction & advantages of work study, work study procedure. Method Study: Introduction, objectives and scope of method study, method study procedure, various recording techniques: different types of charts & diagrams, fundamental hand motion, micro-motion study, cycle graph and crono cycle graph, principles of motion economy.

**Unit II Work Measurement**

(8 Hrs)

Work Measurement: work measurement techniques, time study equipment, number of cycles to be timed, performance rating systems, allowances, computation of standard time, work sampling, synthetic data, predetermined motion time analysis, Maynards operation sequence technique(MOST).

**Unit III Factory Organization**

(6 Hrs)

Principles of organization, importance and characteristics of organization, organization theories-classical organization theory, Neo-classical organization theory, Modern organization theory. types of organization- military or line organization, functional organization, line and staff organization.

**Unit IV Ergonomics**

(6 Hrs)

Ergonomics: fundamentals applications of ergonomics in layout of equipment, design of seating display, design characteristics of control, fatigue, physiological and other causes of fatigue, environmental condition of fatigue, man-machine workplace system, human factors considerations in system design.

**Unit V Production Planning & Control (PPC) and Inventory Control**

(8 Hrs)

PPC its objectives, functions, preplanning and planning, routing, estimating, scheduling-master schedule daily schedule, Gantt Chart, dispatching-centralized vs. decentralized, control, follow up and progress reporting.

Functions, types of inventory. inventory control-importance & functions, inventory costs, factors affecting inventory control, various inventory control models, ABC analysis, lead time calculations.

Sales forecasting:

Introduction, objectives and importance of sales forecasting, methods of sales forecasting, collective opinion, method, Delphi technique, economic indicator method, regression analysis, moving average method, time series analysis.

**Unit VI Various Concepts in Industrial Engineering**

(7 Hrs)

Wages and incentives: concept, types, plans, desirable characteristics;

Value Analysis: Definition, VA & VE, Job plan of VA, FAST diagram.

Supply chain Management: definition, concept objectives, applications, benefits some cases in Indian industries;

JIT: definition, concept, importance, misconception, relevance, applications, push-pull technique.

Introduction to TQM, ISO standard, environmental and TS business standards.

MRP: Introduction, objectives, factors, guidelines, techniques, elements of MRP system, mechanics of MRP-I & II

**Text Books:**

Reference:

MBL105 General Proficiency – V "Employability Skills & Technical Report Writing"
For syllabus: please refer electronics engg. Departments syllabus in sixth semester

MBL 106 General Proficiency – VI Research Methodology Workshop
For syllabus: please refer electronics engg. Departments syllabus in sixth semester

OPEN ELECTIVES
For syllabus of open elective subjects, please refer syllabus provided in B.E. (Electronics Engineering) programme - Sixth Semester

VII Semester
BMEL317 Self Study (2-0-0-2)
Pee-requisite: Nil
Course Objectives:
1. To learn latest topics related with mechanical engineering.
2. To develop written, oral communication
Student is required to study any one of the following during industrial training:
1. National Programme on Technology Enhanced Learning (NPTEL), Video lecturers from IITs & IISc
2. Case study on the topic of interest related to mechanical engineering
The student shall prepare a report of the work. He / she is required to deliver the seminar after completion of training before the committee constituted for the purpose of evaluating the work, in the college.

Course Out Comes:
Students shall be able to
1. Understand the need and importance of research.
2. Carry out research in a scientific manner.
3. Prepare research report and publish research findings
Delivery Method Self study

BMEP405 Industry Internship
Pee-requisite: Nil
Course Objectives:
1. To familiarize students with the real life industry environment and practices.
2. To provide exposure on state of the art technologies.
3. To understand management principles and concepts of finance and project management

Course outcomes:
1. To develop ability to investigate a broadly defined problem, locate, search and select relevant data and the state of the art information concerning an emerging area of technological development in Mechanical Engineering.
2. To select and apply appropriate techniques, resources, and modern engineering and IT tools.
3. To develop ability to communicate in written and oral forms by collating and presenting the topic using PPT and other aids.

Guidelines for the students:
- A group of students (maximum four) may identify an industry of good standing on their own, in consultation with the industry internship coordinator of department.
- Industry from Nagpur and around may be preferred as far as possible.
- The details of indentified industry be intimated to industry internship coordinator in the enclosed format I, well in advance as per the prescribed schedule.
- Every student or a group is required to take permission from the identified industry in the enclosed format II through department training coordinator, for forwarding to IIP cell.
- The industry internship schedule during suitable dates will be May to mid of Nov. (minimum of 6 months).
- Group is required to identify the person of the respective industry who will guide / monitor the industry internship; consent in this respect in writing is essential and is to be submitted to the coordinator in enclosed format II.
All the formalities related to industry internship are to be completed before 1st May of every year.

Exhaustive report of industry internship shall be prepared by the group of students and to be submitted after completion of training duly signed by industry guide/mentor. The industry mentor is to submit review of the student directly to Head of Mechanical Engineering department. The group shall present a seminar on the training using audio visual aids before the seminar committee constituted for the purpose of evaluating the seminar/quality of training. Seminar delivery will be followed by question answer.

Delivery Method
• Industrial Training

BMEP406 Major Project Phase I & Seminar
Pee-requisite: Nil

Guidelines for the students:
• A group of students (maximum four) shall select project topic as per the guidelines during industrial training.

• Project be identified, based on some products manufactured in the industry where they are undergoing industry internship or any other project. In both cases the guide must be consulted to finalize the major project phase I topic/area and title, and detailed synopsis shall be submitted to department project coordinator.

• The same group of students identified earlier for industry internship shall continue to work as a project group.

• Each student shall submit type written report of his work. Each project group has to give presentation, in the College immediately after completion of the training giving all the details of the respective project work completed during the training period.

• A committee shall evaluate the project work. External and internal evaluation will be of 75 marks each.

• After completion of project phase I, phase II shall be continued in VIII semester.

VIII SEMESTER

BMEL 403 OPERATIONS RESEARCH & MANAGEMENT
(3-1-0-4) Total Hrs: 45
Pee-requisite:

1. BAML101 Applied Mathematics-I
2. BAML110 Applied Mathematics-II
3. BAML203 Applied Mathematics-III

Course Objectives:
1. To study importance of Operations Research.
2. To study how real life problems is represented and solved by mathematical model.
3. To study optimization techniques for Transportation & Assignment problems.
4. How to do project management.

Course Outcomes:
1. To understand the importance of operation research in cognitive situations of decision making
2. To select an appropriate operation research model for given real life situation
3. To solve and analyze the problem by applying known models and learned techniques, to obtain most optimum solution.

Unit I (7 Hrs)
Introduction
OR methodology, Definition of OR, Application of OR to engineering and Managerial problems, Features of OR models, Limitation of OR.

Unit II (8 Hrs)
Linear Programming
Definition, mathematical formulation, standard form, solution space, solution – feasible, basic feasible, optimal, infeasible, multiple, optimal, Redundancy, Degeneracy. Graphical and simplex methods, Big M Method, formulation of Dual of LPP.

Unit III (7 Hrs)
Transportation & Assignment Problems

Unit IV (7 Hrs)
Project Management
Introduction Project Management, concept of Project Management & its definition, classification of projects, project life cycle, project identification, project formulation, Project planning, Project organization, Project scheduling, tools & techniques of projects scheduling, project monitoring & control, project audit.

Unit V (8 Hrs)
Project Planning
Unit IV

Inventory control & simulation


Text Books :

Reference Books :

BMEL 404 AUTOMATION IN PRODUCTION (3-0-2-4)

Total Hrs: 46

Pee-requisite:
1. BMEL208 Manufacturing Process-I
2. BMEL306 Manufacturing Process-II

Course Objectives:
1. To introduce concept of fixed automation through design of transfer lines and automated handling systems
2. To introduce numerical control of machine tools, their construction as well as manual and automated part programming of components
3. To provide exposure to automated material handling and tool handling systems such as industrial robots, AGVs and AS/RS
4. To introduce FMS and group technology as modern systems of flexible manufacturing
5. To provide awareness of usage of computers in process planning and quality control

Advance topic on the subject

Course Outcomes:

Upon successful completion of the course, students will be able to
1. Understand the basics of industrial automation.
2. Work on part programming languages used in CNC.
3. Develop programs for simple robot applications.
4. Design automated storage and retrieval systems.
5. Implement GT, CAPP and FMS concepts in manufacturing.
6. Use various quality inspection techniques including machine vision and CMM.

Unit I


Unit II

Numerical Control – Basic concepts, components of NC, types of NC Systems – point to point, straight cut and continuous path, applications and economics of NC CNC part programming: Manual part programming and APT programming

Extensions of NC technology: Direct numerical control, Computer numerical control and Adaptive control.

Unit III

Industrial Robotics – Definition, robot anatomy, robot configurations, robot specifications, Robot peripherals: End effectors, sensors Robot applications – Characteristics of robot applications, work cell layout, robot applications in material handling processing, assembly and inspection.

Unit IV

Unit V (8Hrs)
Flexible manufacturing system and Group technology, FMS – Components, Types of systems, FMS layout configuration computer functions, level of flexibility, data files system reports, FMS benefits, GT - GT philosophy, part families, parts classification & coding, Optic classification systems, production flow analysis, Machine cell design – composite part concept, types of cell design, best machine arrangement, benefits of GT

Unit VI (7Hrs)
Computer Aided Process Planning and Computer Aided Quality Control CAPP - Retrieval & generative CAPP systems, benefits of CAPP, CAQC – Use of computers in QC, off line & online inspection, shop floor control, contact and non-contact inspection techniques, optical and non-optical inspection methods, prominently cover CMM, Machine vision.

Text Book:

Reference S Books:

ELECTIVE-II

BMEL501 COMPUTER AIDED DESIGN (3-0-2-4)
Total Hrs: 46

Pee-requisite:
1. BITL104 Basic of computing
2. BMEL 201 Machine Design-I
3. BMEL304 Machine Design-II
4. BMEL314 Machine Design-III

Course Objectives:
1. To develop basic knowledge and experience of engineering modeling concepts.
2. To understand various transformations used in CAD.
3. To develop basic knowledge and experience of various curve representations and generations.
4. To teach the fundamentals of Finite element method.
5. To study and use various analysis techniques.
6. To develop competency in optimization techniques

Course Outcomes:
1. To understand the basics of design with the help of computer aided design software’s like NX-4.0.
2. To design a system, component or process to meet desired needs. Course includes a design project and extended design homework problems.
3. To apply mathematics, science and engineering. In the lecture portion of this class, students learn some of the theory behind the CAD software they use in the laboratory.
4. To develop an ability to identify, formulate the CAD principles in engineering problems.

Unit I (6 Hrs)
Introduction to CAD, application and advantages of CAD to Mechanical Engineering filed etc. CAD Softwares modules (Operating System, Graphics, Applications, Programming, Communication). Rasterization Principle, Rasterization of line, frame buffer, N-bit plane buffers, simple colour frame buffer.

Unit II (7 Hrs)

Unit III (9 Hrs)
Three dimensional geometric and co-ordinate transformation- Scaling, translation, reflection..

Unit IV (8 Hrs)

Unit V (7 Hrs)
Truss: - Finite Element analysis of 2-D problems- constant Stain Triangle, Mesh generation Techniques, Problems on Beams and Frames.

Unit VI (9 Hrs)

Text Books :

Reference Books :

BMEP501 COMPUTER AIDED DESIGN

Evaluation Scheme: Practical [2P]

PRACTICALS
1. Introduction to CAD softwares.
2. Program on Bresenham’s Line Algorithm.
3. Program on Bresenham’s Circle Algorithm
4. Program on Bresenham’s Ellipse Algorithm
5. Simple examples of two dimensional transformations.
6. Simple examples on three dimensional transformation
7. generation of sketches showing geometric properties using any CAD software.
8. Generation of solid models showing geometric properties using any CAD software.
9. Assembly generation using any CAD software.(At least two)
10. One dimensional problems of Finite Element Method.
11. Finite Element Method problems on truss
13. open ended experiments

ELECTIVE-II
BMEL 502 REFRIGERATION & AIR CONDITIONING (3-0-2-4) Total Hrs: 45

Pee-requisite:
1. BMEL205 Engineering Thermodynamics
2. BMEL315 Heat Transfer
3. BMEL210 Energy Conversion-I
4. BMEL313 Energy Conversion-II

Course Objectives:
1. To get awareness and importance of refrigeration and air conditioning
2. To familiarize with the latest developments in refrigeration and air-conditioning
3. To study both conventional and non conventional refrigeration systems
4. To know environment related issues with use of refrigerants
5. To know ecofriendly refrigerants in refrigeration and air conditioning applications.
6. To know air conditioning equipments
7. To study design of air conditioning systems ducts.

Course Outcomes:
1. To understand principle of cooling with refrigeration cycle.
2. To know use of refrigerant for various applications.
3. To understand psychometry and design air conditioning systems.

Unit I (8 Hrs)

Unit II (8 Hrs)
Multistage vapour compression Refrigeration systems: Multiple compressor & multiple evaporator systems, cascade refrigeration systems. Study of equipments such as compressors, evaporators expansion devices & controls defrosting Methods (types & principle only). Testing & charging of refrigeration systems.

Unit III (7 Hrs)

Unit IV (7 Hrs)

Unit V (8 Hrs)

Unit VI (7 Hrs)
Air transmission & distribution: Principle of air distribution, types of grills & diffusers & their selection criteria, air alteration, types of air filter, distribution of air through ducts, pressure losses in ducts, methods of duct design, duct friction chart, air conditioning controls.

Text books:

Reference Books:
4. ASHRAE hand books, Air Conditioning Engineers, 2005

BMEP 502 REFRIGERATION & AIR CONDITIONING
Evaluation Scheme: Practical [2P]

PRACTICALS:
1. Demonstration of use of various tools and equipments used by a refrigeration mechanic
2. Study of demonstration of miscellaneous refrigeration devices such as vortex tube/Thermoelectric Cooler, Cascade Refrigeration Unit etc.
3. Study & demonstration of window air conditioner/packaged A/c /automotive/A/c system
4. To perform experiments on vapour compression test rig to determine COP of the system.
5. To perform experiments on Air-conditioning test rig.
6. To perform experiments on desert cooler to evaluate its performance.
7. Demonstration of charging a vapour compression refrigeration system

Tutorials
1. Exercises on computer assisted cooling load calculation.
2. Exercises on computer assisted duct design.

Related Industrial Visit
15. Report on visit to air-conditioning or cold storage plant or ice plant.
16. Study of a central A/c plant

ELECTIVE-II
BMEP 503 FINITE ELEMENT METHOD (3-0-2-4)
Total Hrs: 44

Pee-requisite:
1. BMEL207 Mechanics of material
2. BMEL304 Machine design-I
3. BMEL314 Machine design-II

Course Objectives:
1. To teach the fundamentals of finite element method with emphasize on the underlying theory and assumption.
2. To develop theoretical foundations and appropriate use of finite element methods.
3. To enhance skills in numerical techniques and to Understand and perform engineering analysis of machine members.
4. To provide hands on experience using finite element software to model, analyze and design systems.
5. To inculcate programming knowledge of generating algorithms.

**Course Outcomes:**

Upon successful completion of the course, students will be able to:

1. Understand the basics of concepts of FEM.
2. Identify the exact solving problems of quantitative analysis of machine members.
3. Develop an appropriate knowledge of analysis to handle for the mechanical problems, with proper selection of materials and elements.
4. Understand advanced computing techniques and tools in the area of FEA.
5. Understand basics and advances in heat transfer problems.

**Unit I** (7Hrs)

Fundamentals of stress and strain, stress and strain components, stress strain relationship, Elastic constants, plane stress, plane strain, differential equation of equilibrium, compatibility equations, boundary conditions, Saint Venant’s principle, Airy’s Stress function.

**Unit II** (7Hrs)


**Unit III** (8Hrs)

Finite element modeling and analysis using Bar and Beam element – stiffness matrix assembly, boundary conditions, load vector, temperature effects. Two dimensional plane - Local and Global coordinate system, element stiffness matrix, assembly, boundary conditions, load vector, force and stress calculations.

**Unit IV** (8Hrs)

Two dimensional problems using CST and LST – formulation of CST and LST elements, element stiffness matrix, assembly, boundary conditions, load vector. Stress calculation. Axis-symmetric solids subjected to axi-symmetric loading – axi – symmetric formulation using CST ring, element, stiffness matrix, boundary conditions, load vector, calculation of stress

**Unit V** (7Hrs)

Introduction to Isoperimetric and Higher order elements. Introduction to Numerical Integration.

Introduction to dynamic analysis, formulation of mass matrix for one-dimensional bar element, free vibration analysis using one – dimensional bar element. Torsion of prismatic bars using triangular elements.

**Unit VI** (7Hrs)

Steady state one dimensional and two dimensional heat conduction problems using I-D and triangular element respectively. Programming aspects of FEM – Algorithms for, reading Finite Element modeling data, formation of element stiffness matrix, formation of elemental load vector. Assembly of individual elemental stiffness matrix into global ‘ stiffness’ matrix, assembly of individual elemental load vector into global load vector, application of boundary conditions, solution of equations, determination of stresses and strains. Pre – Post processing in FEA.

**Text Books:**


**Reference Books:**


**BMEP 503 FINITE ELEMENT METHOD**

Evaluation Scheme: Practical [2P]

**PRACTICALS:**

1. To study of FEM / FEA
2. To study Processor / Post-Processor
3. 2 Dimensional plane truss by finite element analysis.
4. Finite Element Analysis of Plane Stress Bracket
5. Find the effect of self weight by finite element analysis.
6. Problem of axisymetry in which cylinder subjected to internal pressure
7. To study Steady State Heat Transfer Analysis Problem

**ELECTIVE-III**
BMEL504: MATERIAL HANDLING SYSTEM (3-0-0-3)  
Total Hrs: 50

Pee-requisite: Nil

Course Objectives:

1. To enable understanding of newer manufacturing technologies and developments in respect of non traditional welding and machining
2. To understand constructional details and operations of modern CNC manufacturing systems as well as part programming
3. To provide exposure to current manufacturing philosophies including FMS lean manufacturing and JIT as well as material and enterprise resource planning

Course Outcomes:

1. Student will be able to understand the importance of material handling in the context productivity improvement and maintenance management.
2. The students shall be able to evaluate alternatives select the right kind of equipment based on situation.
3. The students shall be able design new equipment and also undertake modifications in the basic equipment with a view to enhance their capabilities by integrating newer sensor and control technologies.

Unit I (8 Hrs)

Types of intraplant transporting facility, principal groups of material handling equipments, choice of material handling equipment, hoisting equipment, screw type, hydraulic and pneumatic conveyors, general characteristics of hoisting machines, surface and overhead equipments, general characteristics of surface and overhead equipments and their applications. Introduction to control of hoisting equipments.

Unit II (10 Hrs)

Flexible hoisting appliances like ropes and chains, welded load chains, roller chains, selection of chains hemp rope and steel wire rope, selection of ropes, fastening of chains and ropes, different types of load suspension appliances, fixed and movable pulleys, different types of pulley systems, multiple pulley systems. Chain and rope sheaves and sprockets.

Unit III (7 Hrs)

Load handling attachments, standard forged hook, hook weights, hook bearings, cross piece and casing of hook, crane grab for Unit and piece loads, carrier beams and clamps, load platforms and side dump buckets, electric lifting magnets, grabbing attachments for loose materials, crane attachments for handling liquid materials.

Unit IV (10 Hrs)

Arresting gear, ratchet type arresting gear, roller ratchet, shoe brakes and its different types like electromagnetic, double shoe type, thruster operated, controller brakes, shoe brakes, thermal calculations of shoe brakes and life of linings, safety handles, load operated constant force and variable force brakes general theory of band brakes, its types and construction.

Unit V (8 Hrs)

Different drives of hosting gears like individual and common motor drive for several mechanisms, traveling gear, traveling mechanisms for moving trolleys and cranes on runway rails, mechanisms for trackless, rubber-tyred and crawler cranes motor propelled trolley hoists and trolleys, rails and traveling wheels, slewing, jib and luffing gears. Operation of hoisting gear during transient motion, selecting the motor rating and determining braking torque for hoisting mechanisms, drive efficiency calculations, selecting the motor rating and determining braking torque for traveling mechanisms, slaming mechanisms, jib and luffing mechanisms. (Elementary treatment is expected)

Unit VI (7 Hrs)

Cranes with rotary pillar, cranes with a fixed post, jib cranes with trolley, cranes with luffing boom cantilever cranes, cage elevators safety devices of elevators belt and chain conveyors and their power calculations, vibrating and oscillating conveyors pneumatic and hydraulic conveyors, screw conveyors hoppers, gates and feeders. Introduction to AGV’s as new material handling device, use of robot for material handling.

Text Books:

1. Processes & Materials of Manufacture, by Roy A Lindberg, Prentice Hall of India

Reference Books:


ELECTIVE-III

BMEL 505 ADVANCED MANUFACTURING TECHNIQUES (3-0-0-3) Total Hrs: 44

Pee-requisite:
1. BMEL 208 Manufacturing Process-I
2. BMEL306 Manufacturing Process-II

**Course Objectives:**
1. To enable understanding of newer manufacturing technologies and developments in respect of non-traditional welding and machining
2. To understand constructional details and operations of modern CNC manufacturing systems as well as part programming
3. To provide exposure to current manufacturing philosophies including FMS lean manufacturing and JIT as well as material and enterprise resource planning

**Course Outcomes:** After successfully completing the course,
1. Students will be able to understand the importance of new metal joining and machining processes in the context of new age materials now becoming available for industrial applications and commercial use as well as for development of new products.
2. Students shall be able to apply new abrasives and processes, such as creep feed grinding, for productivity improvement vis-à-vis conventional grinding.
3. They shall be able to apply ECM, USM and AJM, and similar new technologies, to difficult-to-machine materials, select tooling and specify process variables as per the requirements of product.
4. The students shall be able to evaluate alternatives and select the right welding, machining or joining process, from amongst a large number of available new technologies, to process materials to suit economic and technological demands of different manufacturing and product development needs of industry.

**Unit I** (7 Hrs)
Non Traditional Machining Processes, its classification and historic development. Different non-traditional machining process viz. Abrasive Jet Machine (AJM), Ultrasonic Machining (USM), Electrochemical Machining (ECM)

**Unit II** (8 Hrs)
Electric Discharge Machining (EDM), Electron Beam Machining (EBM), Laser beam Machining (LBM), Plasma Arc Machining (PAM), Process Parameters and its application of different Non-Conventional Machining Process as above.

**Unit III** (6 Hrs)
Unconventional Welding techniques such as Inert Gas Laser, Electron Beam, Plasma Arc, Atomic Hydrogen, Submerged Arc Welding,

**Unit IV** (6 Hrs)
Explosive Welding techniques, Electro Slag Welding. Recent development in welding, and comparative analysis.

**Unit V** (8 Hrs)
Introduction to CNC, DNC Systems, NC part programming. CNC Turning, Milling, Machining Center, its Classification, different parts and operations.

**Unit VI** (9 Hrs)

**Text Books:**
3. Processes & Materials of Manufacture, by Roy A Lindberg, Prentice Hall of India

**Reference Books:**
4. CNC Machines by Pabla and Adinathan, New Age Publishers

**ELECTIVE – III**
BMEL506 STRESS ANALYSIS (3-0-0-3)

**Total Hrs: 45**

**Pee-requisite:**
1. BCEL107 Engineering Mechanics

**Course Objectives:**
1. To understand basic concepts of stress analysis.
2. To develop competency in analytical methods in solving problems.
3. To make students conversant with concepts of stress distribution.
4. To make the students conversant with basics of optics related to photoelasticity.
5. To make the students conversant with 3-D photoelasticity and to give exposure on fringes.
6. To learn and apply various methods in stress and strain analysis and exposure to new advancements in stress analysis.
Course Outcomes:

1. To justify on the suitability of selected material it is capable to sustain load or pressure to given problem
2. To check elasticity of any material by the help of polar scope.
3. To Check stress propagation of dynamic load problem, heat transfer problem and fluid related problem if it is isoclinic and is chromatic basic
4. To Check some casting material in view of stress freezing phenomenon and fringe multiplication

Unit I (8 Hrs.)
Two Dimensional Problems in Cartesian coordinate system – Fundamentals of stress and strain, stress – strain relationship, Elastic constant, plane stress, plane strain, differential equation of equilibrium Boundary conditions, Saint Venant’s principle, compatibility equation, Airys stress function. Stress analysis of cantilever subjected to concentrated load at it’s end and simply supported beam subjected to uniformly distributed load.

Unit II (7 Hrs.)
Two dimensional problem in polar coordinate systems – General equations of equilibrium in polar coordinate compatibility equation, stress distribution about symmetric, axis, stress analysis of cylinder subjected to ~ internal and external pressure, Pure bending of curved beams, effect of hole on the stress distribution in plates, Stress analysis of rotating circular disk.

Unit III (8 Hrs.)
Two Dimensional Photoelasticity – Introduction to basic optics related to photoelasticity, stress option law, plane and circular Polariscope arrangement, effect of stressed model in plane and circular polariscope, Isoclinic and Isochromatic, stress trajectories, calibration of photoelastic material (determination of fringe constant). Various photoelastic materials and their properties, Casting of photoelastic models, Tardy’s compensation technique, Separation techniques like, shear difference, oblique incidence and electrical analogy.

Unit IV (7 Hrs.)

Unit V (8 Hrs.)
Strain gage technique for stress and strain analysis – Introduction to electrical resistance strain gages, gage, factor, bridge circuit, bridge balance, output voltage of Wheatstone bridge, balancing of bridge, temperature compensation, various bridge configurations, bonding of strain gages to the specimen, determination of principle strains and stresses using strain rosettes. Environmental effects on performance of strain gages, Strain gages response to dynamic strains, Effect of lead wires. Introduction to Strain measurement on rotating components, Static and Dynamic Strain Measurement introduction to semiconductor gages, high temperature strain gages and self – temperature compensated gages. Introduction to Commercial strain indicators.

Unit VI (7 Hrs.)
Grid technique of strain analysis, Brittle coating method for stress and strain analysis, Morie fringe method for stress and strain analysis.

Text Books:

Text Books:
1. Theory of Elasticity – S.P. Timoshenko
2. Experimental stress Analysis – Dally and Riley

Reference Books:
1. Experimental Stress Analysis – T.K Ray
2. Experimental Stress Analysis – L.S. Srinath

Elective – III
BMEL507 AUTOMOBILE ENGINEERING (3-0-0-3)

Pee-requisite: Nil
Course Objectives:
1. To study various components of automobiles
2. To understand various systems & mechanisms in automobiles
3. To study maintenance of automobiles
4. To learn the emerging Technology in the field of automobile Engineering

Course Outcomes:

1. To understand the basics of Automobile Engineering.
2. To understand various systems and sub-systems of Automobile like steering, braking, suspension.
3. To work upon the recent developments in automobiles.
4. To work upon the subject areas of design of automobile components, maintenance of Automobile etc

Unit I (8Hrs)
Introduction, Automobile history and development, Chassis, articulated and rigid vehicles and vehicles layout. Prime movers Engine construction – Structural components and materials, Fuel supply system, cooling and lubrication system, Filters, water pumps, radiators, Thermostats antifreezing Compounds.

Unit II (8 Hrs)

Clutch – Necessity, requirements of a clutch system. Types of Clutches, centrifugal clutch, single & multi plate clutch, fluid clutch.

Gear Box: - Necessity of transmission, principle, types of transmission, sliding mesh constant mesh, synchromesh, Transfer gear box, Gear Selector mechanism, lubrication and control. Torque converter, Automatic Transmission.

Unit III (8 Hrs)


Unit IV (8 Hrs)

Steering systems, principle of steering, center point steering Steering linkages, steering geometry and wheel alignment, power Steering, Special steering systems Tyres, tyres specification, factors affecting type performance, Special tyres wheel balancing, suspension systems- Function of Spring and shock absorber, conventional and Independent suspension System, Telescopic shock absorber, linked suspension systems.

Unit V (8 Hrs)


Unit VI (5 Hrs)

Recent Advances in automobiles such as ABS, Electronic Power Steering, Steer by wire, Traction control, Active suspension, Collision avoidance, Intelligent lighting, Navigational aids and Intelligent vehicle highway system.

Text Books


Reference Books :


Elective – III

BMEL508 MODELING AND SIMULATION (3-0-0-3)

Total Hrs: 42

Pree-requisite: Nil

Course Objectives:

a. To study concept of system and system environment.
b. To understand the concept of random number
c. To understand simulation of systems.
d. To study simulation of queuing and inventory.
e. To know about various simulation languages/packages.

Advance topic on subject

Course Outcomes: After successfully completing the course, the students shall have

1. Enhanced modeling skills
2. Learned various simulation software and facilities
3. Learned various mathematical techniques for developing mathematical model and statistical model.
4. Learned simulation of manufacturing system, material handling system.

Unit I (7Hrs)

System And System Environment

System and System Environment: Component of a system continuous and discrete systems Models of a system modeling. Steps in a simulation study.

Unit II (8 Hrs)

Generation Of Random Number

Random Number Generation: Mid Square The mid product method Constant multiplier method Additive congruential method Test for random numbers: the chi square test, the kolmogorov-Smirnov test, Runs test, Gap test

Unit III (8Hrs)

Random Variate Generation

Random Variate Generation: Inverse transform technique Exponential distribution poission distribution Uniform distribution Weibull distribution Empirical
distribution Normal distribution Building and empirical distribution The Rejection method.

Unit IV (8Hrs) Simulation Of Systems
Simulation of Systems: Simulation of continuous system Simulation of discrete system Simulation of an event occurrence using random number table. Simulation of component failures using Exponential and weibull model

Unit V (7Hrs) Simulation Of Queuing And Inventory
Simulation of single server queue and a two server queue. Simulation of inventory system

Unit VI (4 Hrs) Introduction To Simulation Language/Packages
Introduction to various Simulation languages/ packages.

Text Books :

References Books :

ELECTIVE-III
BMEL509 INDUSTRIAL ROBOTICS (3-0-0-3) Total Hrs.45

Pee-requisite:
1. BITL104 Basic of computing
2. BMEL204 Kinematics of machine

Course Objectives:
1. To understand robot anatomy.
2. To study basic control system models.
3. To learn actuation and feedback components.
4. To study sensors and grippers.
5. To learn the applications in material handling, machining, welding, assembly, etc.
6. To study robot cell layouts.

After successfully completing the course, students will be able to understand the importance and application of robotics in industry.

1. The students shall be able to apply knowledge and demonstrate the skill acquired for operation of industrial robots.
2. They shall be capable of drawing and understanding specifications of robots.

Further they shall be able to evaluate alternatives and select robot for particular application

Unit I (7 Hrs) Automation and Robotics, Robot anatomy, configuration of robots, joint notation schemes, work volume, introduction to manipulator kinematics, position representation, forward and reverse transformations of a 2- DOF arm, a 3- DOF arm in two dimension, a 4 – DOF arm in three dimension, homogeneous transformations in robot kinematics, D-H notations, solving kinematics equations, introduction to robot arm dynamics.

Unit II (7 Hrs) Basic control system models, slew motion, joint – interpolated motion and straight line motion, controllers like on/off, proportional, integral, proportional plus integral, proportional plus derivative, proportional plus integral plus derivative.

Unit III (8Hrs) Robot actuation and feedback components position and velocity sensors, actuators and power transmission devices, mechanical grippers, vacuum cups, magnetic grippers, pneumatic, electric, hydraulic and mechanical methods of power and control signals to end effectors.

Unit IV (8 Hrs) General considerations in robot material handling, material transfer applications, pick and place operations, palletizing and related operations, machine loading and unloading, die casting, plastic molding, forging, machining operations, stamping press operations using robots.

Unit V (7 Hrs) Application of robot in spot welding continuous are welding, spray coatings, Robots in Assembly Operations.

Unit VI (8 Hrs) Robot cell layouts, multiple robots and machine interface, other considerations in work cell design, work cell control, interlocks, error detection and recovery, work cell controller, robot cycle time analysis.

Text Book :

Reference Books:

ELECTIVE-III
BMEL 510 METROLOGY AND QUALITY CONTROL (3-0-3) (Total Hrs 45)
Pree-requisite: Nil

Course Objectives:
1. To provide understanding of the significance of accuracy of dimensional measurement
2. To provide exposure to the measurement practices as well as systems and standards of measurement
3. To provide basic concept of measurement of flattens and straightness as well as standard practices for measuring profiles of components such as gears, screw threads
4. To provide exposure to newer measuring systems namely CMM
5. To introduce the concept of in process and post process quality control through use of control charts and acceptance sampling.
6. To introduce international quality system ISO 9000, TQM concepts

Advance topic on the subject

Course Outcomes:
1. Students will be able to design limit gauges, understand the importance tolerance, interchangeability and selective assembly.
2. To use comparators and other gauging devices for mass production.
3. To learn checking of thread profiles, gear profiles and flat surfaces.
4. To understand the working of CMM.

Unit I (8 Hrs)

Unit II (8 Hrs)
Measurement Through Comparators: Comparators – Mechanical, Electrical and Electronic Comparators, pneumactic comparators and their uses in mass production. Screw Thread Measurement: Element of measurement – measurement of effective diameter, angle of thread and thread pitch, profile thread gauges.

Unit III (8 Hrs)

Coordinate Measuring Machines: Types of CMM, and Applications of CMM

Unit IV (7 Hrs)
Quality Control: Definition, Function, Objectives, Characteristics, Quality, Quality Of Design, Quality Of Conformance, process Control Charts And Process Capability Statistical Quality Control.

Unit V (7 Hrs)
Acceptance Sampling Techniques, O.C. Curves, AQL, LTPD, concept of AOQL, Sampling Plans Single, Double and Sequential Sampling, Inspectn Types And Objectives.

Unit VI (7 Hrs)
Introduction To ISO9000, BIS 14000 Series, TQM Concepts, Quality Assurance, Quality Audit, Quality Circles.

Text Books:

Reference Book:

BMEP 407 MAJOR PROJECT PHASE II (0-0-8-8)
Pree-requisite:
1. BMEP406-Major project phase I
Major project phase II shall be continued after satisfactory completion of phase I. Project work may consist of fabrication and experimental work or exhaustive analysis of system in the context of 2-3 factors identified belonging to the industry, where he/she has undergone the training. The group has to present at least two project progress seminars. Each student has to prepare final project report, phase I and phase II, under the guidance of the project guide. Each group has to present on ppt. final project seminar consisting of both phase I and phase II before the committee constituted for the purpose of evaluating the project.
## DEPARTMENT OF CIVIL ENGINEERING
### SCHEME OF B.E. THIRD SEM (2012-2013)

<table>
<thead>
<tr>
<th>Sub. Code</th>
<th>Name of the Course</th>
<th>Teaching Scheme</th>
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<th>ESE Duratio n (hrs)</th>
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<td>Mathematics – III</td>
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<td>BCEL211</td>
<td>Building Const &amp; Materials</td>
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# SCHEME OF B.E. FOURTH SEM (2012-2013)

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**Elective-I**

- BCEP316: Operation Research & Management
- BCEL317: Advanced Structural Design
- BCEL319: Ground Water Management
- BCEL319: Environmental Management

**OPEN ELECTIVES:**

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**Total Credits:**

- 23 Credits
- 120 ECTS
- 360 Hours
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xxx Indicates the Elective II and Elective III

**Elective II**
- **BCEL402** ARTIFICIAL NEURAL NETWORKS & FUZZY LOGIC ANALYSIS
- **BCEL427** MATRIX METHOD OF STRUCTURAL ANALYSIS
- **BCEL428** ADVANCE CONCRETE DESIGN
- **BCEL441** ADVANCED HYDRAULICS
- **BCEL432** GREEN BUILDING

**Elective III**
- **BCEL433** ADVANCED TRANSPORTATION ENGG.
- **BCEL434** MUNICIPAL & INDUSTRIAL WATER TREATMENT
- **BCEL435** REMOTE SENSING & GIS
- **BCEL436** ADVANCED STEEL DESIGN
- **BCEL437** EARTH AND EARTH RETAINING STRUCTURE
- **BCEL438** COMPUTATIONAL FLUID DYNAMICS
## SCHEME OF B.E. EIGHTH SEM (2012-2013)

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SEMESTER - III

BAML 205: APPLIED MATHEMATICS - III (3-1-0- 4)
Total Hrs:

Course Prerequisites: XII Mathematics

Co-Requisites: ---

Course Objectives:

1. Learning periodic functions and their Fourier expansion.
2. Learning partial differential equation and calculus of variation and its relevance in engineering.
4. Introduction to optimization method

Course Outcome:

Student shall be able to

1. Understand basic facts of mathematics about the field of analysis of any Engineering problem.
2. Know the standard ways in which the problem can be approached.
3. Apply basic concepts to engineering problem

Unit I: Fourier Series.
Periodic functions and their Fourier expansion, even and odd function, change of interval, half range expansion.

Unit II: Partial Differential Equation.
Partial Differential Equation of 1st order 1st degree i.e, Langrange's form, Linear homogeneous p. d. equation of nth order with constant coefficient method of separation of variables. Application to simple problems of variation of strings and beams, elementary concept of double Fourier series and their application to simple problems of vibration of rectangular membrane.

Unit III: Calculus of variations.
Maxima and minima of function, variation and its properties, Euler's equation, functional dependent on 1st and 2nd order derivatives, The Rayleigh-Ritz method, simple application.

Unit IV: Numerical Methods (Equations)

Unit V: Numerical Methods (Differential Equations)

Unit VI: Introduction to Optimization Techniques.
Linear programming, mathematical model formulation, Solutions by Graphical & Simplex method.

Text Books:

Reference Books:
4. Introductory methods of numerical analysis by S. S. Sastru.

BCEL211 : BUILDING CONSTRUCTION & MATERIALS (3-0-0-3) Total Hrs: 40

Course Prerequisites: ---
Co-Requisites: ---

Course Objectives:

1. To understand the concept of sub-structure and super-structure.
2. To know the different types of building, elements of building and material widely used in building construction.
3. To design and execute the infrastructure projects as per specifications.

Course Outcome:

Student shall be able to

1. Demonstrate construction process of various building elements.
2. Use the knowledge of various construction materials, process and types of building.
3. Design simple building component and able to laid down specifications

Unit I:

[6 Hrs]


Unit II : [6 Hrs]
1. Arches and Lintels: Terminology in contraction, type's chajjas and canopies, pre cast Lintels & Arches.
3. Floors And Roofs: General principle, types and method of construction upper floors finishing quality. Flat and pitches roofs, types and their construction features.
4. Stairs: Types of stairs, functional design of stairs.

Unit III: [7 Hrs]
1. Doors and Windows: Purpose materials of construction and types.
2. Plastering and Pointing: Necessity, types and methods.
3. Temporary Timbering: Centering and formwork shoring, underpinning and scaffolding.

Unit IV: [7 Hrs]
1. Building stones: Introduction, requirement of good building stones, testing of stones, quarrying of stones, dressing of stones, artificial stones, common building stones in India.
3. Lime: Classification of lime, field slaking of lime, preparation of putty, properties of lime, use of lime of construction.

Unit V: [7 Hrs]
1. Timber & Wood based Products: Introduction, sources of timber, identification of timber felling & conversion, moisture in timber, defects in timber, decay of timber. Different type of timber used in building construction, wood base product such as plywood, particle board, veneer, sunmica and their manufacturing process.
2. Plastics: Classification, advantages, properties, modern development in plastics.
4. Asphalt and Bitumen: IRC specification, physical properties & its use in construction.

Unit VI: [7 Hrs]
1. Flooring and other tiles: Types, Shahabad, Kotta, Granite, Glazed and Unglazed, ceramic tiles, Plain cement, Mosaic tile, manufacturing process of tiles, cutting and polishing of natural stones used.
2. AC sheets: Corrugated & plain
3. Water proofing material & its uses, termite proofing and fire resisting materials.

Text Book:

Reference Books:

BCEL212: STRENGTH OF MATERIALS (3-1-0-4)
Course-requisites: Engineering Mechanics
Co-requisites: Strength of Materials (PR)
Course Objectives:
1. To study the various mechanical properties of materials.
2. To provide systematic methods for solving engineering problems in solid mechanics.
3. To use the fundamental concepts of stress, strain and elastic behavior of materials.

Course Outcomes:
Student shall be able to
1. Understand various mechanical properties of materials
2. Understand the concept of elasticity and analysis of the members under various loading conditions.
3. Use the knowledge of analysis and design of structural members subjected to various stresses.

Unit I:
Mechanical Properties and Uniaxial Problems: [7 Hrs]
Types of force distribution, Concept of stress and strain, Stress strain behavior of ductile and brittle material in uniaxial state of stress. Elastic, Plastic and strain hardened zones stress - strain relations, Elastic constants, Relation between elastic constants.
Uniaxial loading and deformation of simple cases of statically indeterminate problems under axial loading. Thin walled pressure vessel, Cylindrical and spherical subjected to internal pressure

Unit II: [8Hrs]
Axial Force, Shear Force & Bending Moment Diagrams:
Concept of free body diagram, Types of loads, Determination of axial forces and Bending moment at a section, Axial forces SF and BM diagram in beams and simple frames, Differential relation between shear force and bending moment, Relation between load and shear force.
Unit III: [8 Hrs]
Stresses in Beam:
Bending stresses in simple beam, Assumptions and derivation of simple bending, Theory relation between bending moment, Bending stress and curvature. Homogeneous and composite beams. Shear stresses in simple beams, Shear flow and shear stress distribution, Shear Stress in composite beams. Combined effect of bending and axial force.

Unit IV: [6 Hrs]
Torsion of Shafts:
Torsion of circular sections, Assumptions and derivation of relations between torsional moment, Shear stresses and angle of twist. Torsional stress in solid and Circular sections, Torsion in thin walled hollow section, Closely coiled helical springs. Leaf spring.

Unit V: [8 Hrs]
Deflection of Beam:
Derivation of differential equation of moment curvature relation, Differential equation relating deflection and moment shear and load, Deflection of simple beams by integration.

Unit VI: [8 Hrs]
State of Stress In Two Dimensions:
State of stress in two dimensions, Differential equation of equilibrium, Transformation of stresses, Principal stresses, Maximum shear stresses, Mohr’s circle, Combined bending and torsion, Combined effect of Torsion and Shear. Shear flow in thin walled sections, concept of shear center of thin walled section, Unsymmetrical bending.

Text Books:

Reference Books:

BCEP212 : STRENGTH OF MATERIALS (0-0-2-1)
Evaluation scheme: Practical [2P]
Practicals

List of Practical:
(Any Ten from the following list)
To determine Tensile strength of different metals
To determine the hardness of different metals
To determine Impact strength of different metals by Izod Impact Test

To determine Impact strength of different metals by Charpy Impact Test [8 Hrs]
To determine the shear strengths of different metals
To determine the stiffness and modulus of rigidity of the spring
To determine the flexural strength of wooden and concrete beams
To determine the Torsional strength of different metals
To determine the compressive strength of concrete blocks
To determine the transverse strength of flooring tiles
To determine the compressive strength of wet and dry bricks
12. To determine the compressive strength of wooden block (Parallel & Perpendicular to the grains)
13. To find the values of bending stress and Young’s modulus of elasticity of simply supported beams carrying concentrated load at center [6 Hrs]

BCEL 213 : GEOTECHNICAL ENGINEERING I (3-1-0-4) Total Hrs.: 45
Course-Prerequisites: Applied Mathematics -II Co-Requisites: Geotechnical Engineering- I (PR)
Course Objectives: [8 Hrs]
1. To provide basic knowledge for determining various soil parameters.
2. To understand stress characteristics and their distribution in soil.
3. To determine the various engineering properties and their impact on the design and construction of various civil engineering structures.

Course Outcomes:
Student shall be able to
1. Understand various properties of soil and their classification.
2. Understand various stresses and their distribution in soil and other engineering properties of soil.
3. Recommend the various types of foundation and substructures, soil retaining structures etc.

Unit I: [4 Hrs]
Introduction: Formation of soil, residual & transported soils, soil, generally used in practice such as sand, gravel,organic silt, clay, Bentonite, black cotton soil etc.

Unit II: [8 Hrs]
Physical Properties: Specific gravity, water content, shape and size, grain size distribution curves, relative density, consistency of soils, Unified soil classification system, IS soil classification system, field identification tests.
Unit III [8 Hrs]
Permeability: Darcy’s law, determination of permeability, equivalent permeability in stratified soils, in situ permeability test, 1-D flow, Laplace’s equation, flow nets, method to draw flow nets, Their characteristics & seep age, uplift pressure, confined and unconfined flows, piping, filter criteria. Preliminary problems of discharge estimation of homogeneous soils. Effective, Neural and total stresses in Soil mass.

Unit IV [8 Hrs]
Compaction and Consolidation: Compaction: General principles, tests, factors affecting compaction, field compaction, compaction techniques. Consolidation: Fundamentals, 1-D consolidation, normally and over-consolidated clays, void ratio – pressure relationships, compressibility characteristics, time rate of consolidation, coefficient of consolidation, curve fitting techniques, settlement, secondary consolidation, 3-D consolidation, vertical sand drains.

Unit V [7 Hrs]
Shear Strength of Soil: Principle of effective stress, Mohr-Coulomb failure criterion, direct shear test, unconfined compression test, Triaxial shear test: consolidated drained, consolidated undrained, unconsolidated undrained, vane shear test, shear strength of clays and sands, critical void ratio, stress path, pore-pressure coefficient

Unit VI [10 Hrs]
Stress Distribution and Advance methods for soil stability: Stress distribution in soil mass, Boussinesque’s, Theory point & Uniformly loaded rectangular & circular areas, Newmark’s charts. Soil nailing, geo membrane, chemical and mechanical stabilization.

Text Book:

Reference Books:

BCEP 213: GEOTECHNICAL ENGINEERING I (0-0-2-1)

List of Practical:
Any ten may be performed
1. Determination of Moisture content of given soil sample.
2. Determination of Specific gravity of soil
3. Grain size Analysis – (Sieve Analysis)
4. Determination of Liquid Limits of given soil sample
5. Determination of Plastic Limit of given soil sample
6. Determination of Shrinkage Limit of given soil sample
7. Determination of Permeability by constant head method.
8. Determination of Permeability by falling head method.
10. Modified Proctors test
11. Determination of Field Density by sand replacement method.
13. Consolidation Test
14. Open Ended Experiment

B) Field visit is compulsory (Soil exploration or compaction)

BCEL 214: FLUID MECHANICS – I (3-1-0-4)
Total Hrs.: 45
Course Prerequisites: Engineering Mechanics

Co-Requisites: Fluid Mechanics - I (PR)

Course Objective:
1. To study the basic behavior of fluids and fluid system and the laws governing this behavior
2. To understand and apply the basic concepts of Fluid Mechanics to carry out professional engineering activities in the field of fluids.
3. To apply scientific strategies to analyze qualitatively and quantitatively the problems and give solutions.

Course Outcomes:
Student shall be able to
1. Understand various properties of fluid and its behavior.
2. Apply concept of fluid mechanics in real world problems.
3. Analyze and provide the feasible solutions.

Unit-I [6 Hrs]
Introduction:
Fluid and continuum, Physical properties of fluids, Rheology of fluids.

Unit-II [6 Hrs]
Kinematics of Fluid flow: Types of fluid flows: Continuum & free molecular flows. Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, rotational and irrotational flows,
compressible and incompressible flows, subsonic, sonic and supersonic flows, sub-critical, critical and supercritical flows, one, two and three dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream function and velocity potential, source, sink, doublet and half-body.

Unit-III
Fluid Statics
Pressure-density-height relationship, manometers, pressure transducers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjected to linear acceleration and uniform rotation about an axis.

Unit-IV
Dynamics of Fluid Flow: Euler’s Equation of motion along a streamline and its integration, Bernoulli’s equation and its applications- Pitot tube, orifice meter, venturi meter and bend meter, Hot-wire anemometer, notches and weirs, momentum equation and its application to pipe bends.

Unit-V
Dimensional Analysis and Hydraulic Similitude:
Dimensional analysis, Buckingham’s Pi theorem, important dimensionless numbers and their significance, geometric, kinematics and dynamic similarity, model studies.

Unit-VI
Laminar and Turbulent Flow:
Equation of motion for laminar flow through pipes, Stokes’ law, transition from laminar to turbulent flow, turbulent flow, types of turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and pipe networks.(Hardy – Cross only)


BCEP 214: FLUID MECHANICS –I
3-1-0-4

List of Practical:
Any ten may be performed
1. To verify Bernoulli’s theorem
2. To determine co-efficient of discharge of Venturimeter.
3. To determine co-efficient of discharge of Orificemeter.
4. To determine co-efficient of discharge of Rectangular Notch.
5. To determine co-efficient of discharge of Triangular Notch.
6. To determine co-efficient of discharge, contraction & velocity of an orifice.
7. To verify momentum equation using the experimental set-up on diffusion of submerged air jet
8. To determine friction factor for pipes of different sizes
9. To find a critical Reynold’s number for a pipe flow
10. To determine the metacentric height of a floating body
11. To determine flow rate using Rotameter.
12. To determine pressure head of water in pipe line by means of pizometer tube
13. To determine pressure head of water in pipe line by means of U tube

BCEL 215: WATER RESOURCES ENGINEERING - I (3-1-0-4)
Total Hrs.: 45

Course-Prerequisites: ---

Co-Requisites: ---

Course Objectives:
1. To study the different hydrological parameters.
2. To understand hydrological statistics and design.
3. To characterize and mitigate natural and man-made hazards.

Course Outcomes:
Student shall be able to
1. Understand different terminology of hydrology.
2. Apply the fundamental concept of hydrology in designing and analysis.
3. Provide solution to various problems related to natural and man-made hazards.
Unit I:
Introduction.

Precipitation:
Definition and classifications. Selection of site, density and adequacy of rain-gauge station.

Unit II:
Infiltration: Definition, mechanism, factors affecting, numerical.
Evaporation: Definition, mechanism, factors affecting, numerical.
Transpiration: Definition, mechanism, factors affecting, numerical.

Unit III:
Run off
Source components of run off, classification of streams, factors affecting. Estimation of discharge and Measurement methods, numerical.

Hydro graphs:

Unit IV
Statistical methods

Floods
Causes and effects, factors affecting Flood routing and flood forecasting, numerical.

Unit V:
Geohydrology
Introduction: occurrence and distribution, Ground water exploration techniques, Introduction to hydraulics of well, Numerical.
Ground water quality, geomorphic and geologic control, Ground water province of India.

Unit VI:
Ground water recharge

Project planning for water resources
Introduction: Water resource planning

Text Books:

Reference Books:


MBL 102 GENERAL PROFICIENCY:-II : Foreign Language
For syllabus: please refer electronics engg. Departments syllabus in third semester

SEMESTER-IV

BCEL 216: CONCRETE TECHNOLOGY (3-0-0-3)
Total Hrs.: 40
Course-Prerequisites: Building Construction & Materials
Co-Requisites: Concrete Technology (PR)

Course Objectives:
1. To understand the properties of concrete ingredients.
2. To study the compressive, flexural, split strengths etc and other non destructive tests.
3. To learn mix design of concrete and its application in construction work.

Course Outcomes:
Student shall be able to
1. Use the knowledge of various constituents of cement and manufacturing process of cement.
2. Understand various methods to determine strength of concrete.

Unit I
Cement:

Aggregates:
Sources of aggregates, classification and nomenclature, Coarse and fine aggregate, normal weight (light and heavy weight aggregates). Aggregate characteristics and their significance in strength, workability, placement and compaction of concrete. Sampling, Particle shape and texture, Bond of aggregate, size & grading of aggregate strength of aggregate. Mechanical properties and tests – Specific gravity, bulk density, porosity, absorption of aggregate, moisture content of aggregate, bulking of sand abrasion test, impact value. Deleterious substances in aggregate, organic impurities clay and other fine material etc.

Unit II

Unit III
Strength of concrete: Gain of strength, w/c ratio. Factors affecting compressive strength, w/c ratio, type of cement, air entrainment, aggregate, mixing water, admixtures, curing conditions. Tensile and flexural strengths, relation between compressive and tensile strength. Failure modes in concrete, cracking in compression. Impact strength, fatigue strength, shear, elasticity, poisson’s ratio.


Non Destructive test: significance, rebound hammer, ultrasonic pulse velocity test.

Unit IV
Additives and admixtures: Types of admixtures, natural products, diatomaceous earth, calcined clays of shale’s, volcanic glasses, byproducts – pozzolans, fly ash, silica fume, rice husk ash, metakaoline, G.G. blast furnace slag, admixtures- air entraining, water reducing, accelerators, retarders, plasticizers and superplasticizers, permeability reducing, grouting agents, surface hardeners.

Shrinkage: early volume changes, drying shrinkage, mechanism of shrinkage, factors affecting shrinkage, influence of curing and strong conditions, differential shrinkage, carbonation, creep: factors influencing, relation between creep and time, nature of creep, effect of creep.

Unit V
Mix Design: Process, statistical relation between main and characteristic strength, variance, standard deviation, factors affecting mix properties, grading of aggregates, aggregate/cement ratio etc. Degree of quality control, design of mix by Road Note No. [04] (BS), ACI method.

Unit VI
Durability of concrete: Significance, water as an agent of deterioration, permeability of concrete, air sulphate attack and control, sea water attack, acid attack, efflorescence, resistance of corrosion, abrasion and cavitation, process of rusting of steel.

Text Books:

Reference Books:

BCEP-216 : CONCRETE TECHNOLOGY L (0-0-2-1)
Total Hours: 20

Evaluation scheme: Practical [2P]
List of Practical:
Minimum Ten Experiment from following List
1. To determine Fineness Modulus (FM) of coarse Aggregate
2. To determine the Specific Gravity of aggregate by pycnometer method
3. To determine Impact value of Aggregate
4. To determine Crushing Strength of Aggregate
5. To determine flakiness Index and elongation Index of Aggregate
6. To determine Abrasion Value of Aggregate
7. To determine Bulking of Sand
8. To determine silt content in sand
9. To determine fineness of cement
10. To determine the Consistency of Cement by Vicat’s Apparatus
11. To determine initial and Final Setting time of given cement by Vicat’s Apparatus
12. To determine compressive strength of cement
13. To determine Soundness cement
14. To determine the Workability of Concrete by Slump Test
15. To determine the Workability of Concrete by Compaction Factor Test
16. To determine Compressive Strength of Concrete
17. To determine the Flexural Strength of Concrete
18. To determine compressive strength by rebound hammer test
19. To determine modulus of rigidity by ultrasonic pulse velocity test
20. Concrete Mix Design (Any one of the method)

BCEL217: SURVEYING-I(3-1-0-4)
Total Hrs.: 45
Course-Prerequisites: Applied Mathematics -I
Co-Requisites: Surveying - I (PR)
Course Objective:
1. To understand the basic principles of surveying.
2. To study the coordinate systems and measuring techniques.
3. To study different types of survey and instruments used.

Course Outcomes:
Student shall be able to
1. Use basic principles of survey.
2. Measure angles, distances and elevations.
3. Use the surveying instruments in surveying work.

Unit I - Introduction (08 Hrs)
- Surveying - Necessity & purpose, Geodetic & Plane Surveying, Classification of Survey, Principles of Surveying, Division of Survey.
- Instruments and Measurement: Linear measurements, Corrections to field measurements, ranging out, Direct & Indirect ranging. Use of Distomat.
- Chain surveying: Basic definition, Principle of Chain Surveying, Survey station, Cross Staff Survey, Chain Traversing, Optical Square, Line Ranger, Prism Square, Obstacles in Chaining, Plotting of Chain Survey Work, Errors - Sources & Types.

Unit II - Instruments for Measurement of Angles (08 Hrs)
- Prismatic compass, Surveyor's compass, their use & adjustment.

Unit III - Instruments for Measurement of Elevation (05 Hrs)
- Dumpy level, Tilting level & Automatic level. Details of their construction.

Unit IV - Leveling (10 Hrs)
- Definition of terms, Principle of leveling, Reduction of levels, Classification of leveling, Profile leveling, Longitudinal sectioning, Cross Sectioning, Reciprocal leveling, Distance to vertical horizon, leveling methods, Leveling staves, Booking & reduction of field notes, curvature & refraction. Sensitivity of bubble tube. Errors in leveling.

Unit V - Theodolite (8 Hrs)
- Introduction, Type of theodolite, Temporary & Permanent adjustment, Measurement of Horizontal & Vertical angles, Magnetic Bearing, Prolonging a line, Lining in. Other uses of theodolite.
- Theodolite traverse: Consecutive & Independant Coordinates, Adjustment of Closed traverse, latitude & departure, Gale's traverse table, area calculation by coordinates.

Unit VI - Plane Table Surveying (06 Hrs)
- Equipments, methods two point & three point problems, Advantages & disadvantages of plane tabling. Lehman's rules.
- Construction & use of Major & Minor instruments like EDM, Total Station, Abney level, Box sextant Planimeter Tangent Clinometer, Ghat Tracer.

Text Books:

Reference Books:

BCEP 207: SURVEYING-I (0-0-2-1)

A) List of Practical
i) Use of major Equipments. (Cross Staff, Prismatic Compass & Surveyors Compass, Dumpy Level, Transit Theodolite)
ii) Measurement of Length by using Distomat.
iii) Chain and Compass Surveying.
   i) Measurement of distance by Ranging and Chaining.
   ii) Locating various objects by Chain & Cross staff surveying.
   iii) Determination of area of polygon by Chain and Cross staff survey.
   iv) Measurement of bearings of sides of traverse with Prismatic Compass and computation of correct included angle.
   v) One full size drawing sheet locating given building by Chain and Compass traversing.
iv) L – Section and C – Section of Road.
   i) Determination of elevation of various points with dumpy level by Collimation Plane Method and Rise & Fall Method.
   ii) Determination of elevation of various points with Dumpy Level by keeping staff inverted. Fixing Bench Mark with respect to Temporary Bench Mark with Dumpy Level by Fly leveling and Check leveling.
   iv) One full size drawing sheet on L – section and C – section of Road.
   v) One full size drawing sheet Contour Plan of given area.
area.

v) Plane Table Survey.
   i. One full size drawing sheet locating given building (traverse) by Radiation Method by Plane Table Traversing.
   ii. One full size drawing sheet locating given building (traverse) by Intersection Method by Plane Table Traversing.
   iii. Three point problem in Plane Table Traversing.

vi) Theodolite Traverse.
   i. Measurement of horizontal angles with Theodolite by means of Repetition Method.
   ii. Measurement of vertical angles using theodolite.
   iii. One full size drawing sheet locating given building (traverse) by Theodolite traversing.

vii) Use of minor instruments (Planimeter, Box Sextant, Abney Level)

viii) Measurement of area of irregular figure by using Planimeter.

B) SURVEY DRAWING SHEET (FULL SIZE)
   1. Traversing Locating given building by chain and compass traversing.
   2. L-Section and cross section of road.
   3. Locating given building by theodolite traversing.
   4. Locating given building by plain table traversing.
   5. Three point problem in plane table traversing.
   6. Contour plan of given area.

C) SURVEY CAMP (ON ANY OF FOLLOWING TOPICS)
   1) Road Project  2) Contour Project

Course Objectives:
   1. To understand the concept and terminologies used in computer programming.
   2. To develop interactive computer programs.
   3. To use programming language for solving Civil Engineering problems.

Course Outcomes:
   Student shall be able to
   1. Apply knowledge of programming Language.
   2. Develop various computer programs.
   3. Use variables, constants etc in developing programs for solving the civil engineering problems.

Unit I : Introduction [5 Hrs]
   C-Fundamentals, CHARACTER SET data type constant and variables, Declaration of constants & variables, Expression, Statements, Symbolic constants.
   Operator and Expression, Arithmetic operator, Unary operator, Relation and Logical operator, Assignment operators, the conditional operator, Library functions.
   Data input & output Interactive programming preparing & running a complete simple program.

Unit II : Control Statements [5 Hrs]
   Control statement, the WHILE statements, do-while, for nested loop, if –else, switch break, continue, goto statement, comma operator.

Unit III : Advance Topics [5 Hrs]
   Functions, Storage class, Arrays, Pointers, structures and Unions, Data files, File Handling, Link list.

Unit IV [5 Hrs]
   Fundamental of Numerical Methods, Interpolation & extrapolation. Numerical Integration (Simpsons method, Trapezoidal method, Newtons Gauss Quadrature method), Interactive Computer Program Development

Unit – V [5 Hrs]
   Solution of Linear Algebraic Equations, Gauss quadrature method), solution errors. Interactive Computer Program Development

Unit – VI [5 Hrs]
   Solution of non Linear Equations (Newton Raphson Schemes), Initial & Two point boundary value problem, Euler’s Runge-kutta Milnes etc, Interactive Computer Program Development

Text Books:

Reference Books:

BCEP 218 : COMPUTER APPLICATION IN CIVIL ENGINEERING (2-0-0-2) Total Hrs.:30

Course-Prerequisites: Basics of the Computing
Co-Requisites: Computer Application in Civil Engineering (PR)

BCEP 218 : COMPUTER APPLICATION IN CIVIL ENGINEERING (0-0-2-1) Total Hours: 20

List of Practical:
1. Program for Sum of Three Integers.
2. Program for finding the average value of three Numbers.
3. Program for Interchanging Two Values.
4. Program for finding the Number is Even or Odd
5. Program for finding the Number is Positive or Negative
6. Program to decide Profit or Loss.
7. Program for finding the given year is Leap year or not.
8. Program for finding the number is Perfect Square or Not.
9. Program for Shear Force & Bending Moment for beam carrying UDL.
11. Program for Bisection Method
12. Program to find the Root of an equation using Newton Raphson Method.
13. Program to Find Integral of given function by using Simpson’s 1/3rd Rule.
15. Program to solve equation by using Euler’s Method.
16. Program to solve the system of Linear Equation Using Gauss Elimination Method.
17. Program to solve equation by using Second Order Runge-kutta Method.
18. Program to solve equation by using Fourth Order Runge-kutta Method.

BCEL 312 : FLUID MECHANICS-II

Course Prerequisites: Fluid Mechanics -I
Course Co-requisites: Fluid Mechanics –II (PR)

Course Objectives:

1. To understand the flow pattern in the open channels, pipes and immersed body.
2. To understand hydraulic models.
3. Study different types of pumps and turbines to know their characteristics.

Course Outcomes:
Student shall be able to
1. Solve the problems related to boundary layer, flow in pipe and channels.
2. Make hydraulic model and provide a conclusion.
3. Calculate the efficiency of the pump and turbines.

UNIT I

1. LAMINAR FLOW : Steady uniform laminar flow in circular pipes ; Velocity and shear stress distribution ; Hagen - Poiseuille equation.
2. BOUNDARY LAYER THEORY : Nominal thickness, displacement thickness , momentum thickness of the boundary layer . Boundary layer along a long thin plate and it’s characteristics; Laminar boundary layer ; turbulent boundary layer , laminar sub layer : Separation of boundary layer on plane and curved surfaces.
3. REAL, INCOMPRESSIBLE FLUID FLOW AROUND IMMERSED BODIES: In general definition of drag and lift; Flow past plates , cylinders and spheres ; darg on sphere , cylinder and flat plate.

Unit II

4. FLOW THROUGH PIPES : Hydraulically smooth and rough pipes ; Frictional resistance to flow of fluid in smooth and rough pipes ; Nikurade’s experiment ; Moody's chart , Darcy-Weisbach & Hazen William,’s equation for frictional head loss ; Hydraulic gradient and energy gradient : Pipes in series and parallel; Branched pipes ; Siphon; transmission of power through pipes ; Hardy – Cross method of pipe networks; Water hammer pressure head due to sudden closure of valve.

Unit III

5. FLOW THROUGH OPEN CHANNEL : GENERAL : Types of channel and their geometrical properties; Types of flow in open channel

UNIT IV

6. APPLICATIONS OF SPECIFIC ENERGY , GRADUAL TRANSITIONS OF CHANNELS :

GRADUALLY VARIED FLOW : Dynamic equation for GVF ; Classification and characteristics of surface profile; Direct Step method of computing profile length.

RAPIDLY VARIED FLOW : Definition of hydraulic jump ; Equation of hydraulic jump in horizontal rectangular Channel ; Length & height of jump ; Energy loss in jump ; Classifications of jump

Unit V

7. HYDRAULIC MODELS : Difference between model and prototype; Similitude-type of similarities ; Model laws Reynolds model law and Froude’s model law ; Types of model – distorted , undistorted ; Froude’s method of determining resistance to partially submerged objects like ship.

8. FLUID MACHINERY:

IMPACT OF JET : Impact of Jet on stationary and moving curved vanes TURBINES : Definition ; Gross and net heads; different efficiencies; Classification of turbines; component parts and working principles ; selection of turbines on the basis of head and specific speed.

Unit VI

9. CENTRIFUGAL AND RECIPROCATING PUMPS
**CENTRIFUGAL PUMP**: Component parts; Working principle; Static and manometric heads; different efficiencies; Specific speed; Theoretical aspect of multistage pump; pump in parallel; Priming devices; Trouble & remedies; Main & operating characteristics curves. Selection on basis of operating characteristics.

**RECIPIROCATING PUMPS**: Components parts; Working principle; Work done of single & double acting pumps; Negative slip; Air vessels – Working principle and necessity.

**HYDRAULIC TURBINES**: Introduction, Impulse and reaction turbine, pelton turbine, Francis turbine.

**Text Books:**

**Reference Books:**

**BCEP 312: FLUID MECHANICS-II**

**List of Practical:**
1. To determine streamline patterns of streamline flow around immersed bodies.
2. To determine friction factor for given pipes and to verify Darcy-Weisbach equation.
3. To determine performance characteristics of Centrifugal Pump.
4. To determine performance characteristics of Reciprocating Pump.
5. To determine performance characteristics of Francis Turbine.
6. To determine performance characteristics of Pelton Turbine.
7. To determine Manning’s or Chezy’s constant for Open Channel.
8. To determine Froude’s number by Hydraulic Jump in a horizontal rectangular channel.
9. To determine minor losses for flow through pipes.
10. To determine Gradually Varied Flow profiles.
11. To determine velocity distribution in a given pipeline and verify momentum equation.
12. To determine co-efficient of discharge of venturiflume.

**BCEL 318 : GEOTECHNICAL ENGINEERING – II**

**Course-Prerequisites**: Geotechnical Engineering- I

**Co-Prerequisites**: Geotechnical Engineering- II (PR)

**Course Objectives:**
1. To learn soil exploration, planning and methods of exploration
2. To design different types of foundations and retaining structures
3. To learn ground improvement methods and soil stabilization techniques

**Course Outcomes:**
Student shall be able to
1. Plan and execute the soil exploration
2. Design the various types of foundation and earth retaining structures.
3. Use various appropriate ground improvement techniques.

**Unit I :**

**Chapter:1** Soil exploration, planning, objectives and methods of exploration, soil boring, spacing and depth of boring, boring log, hand augers, wash boring, percussion drilling, rotary drilling, Type of samples and samplers, area ratio, inside and outside clearance, Soil investigation report

**Chapter:2** Field Tests: Plate load test, Standard Penetration test (SPT), Static Cone Penetration Test (SCPT) and Dynamic Cone Penetration Test (DCPT), Field California Bearing Ratio test, Field vane shear test, geophysical methods such as electrical resistivity and soil refraction methods.

**Unit II :**

**Chapter:3** Bearing Capacity: Bearing capacity, its criteria, factors and various methods. Analytical Methods: Terzaghi’s, Skemtpon’s, Meyorhoff, BIS method for bearing capacity, Effect of water table, contact pressure distribution diagram below the base of footing. Bearing capacity based on plate load test results, SPT value, SCPT test results, Pressuremeter test,

**Chapter: 4** Settlement: Evaluation of soils settlement: immediate, primary and secondary settlement for footing resting on homogenous, isotropic, cohesive and cohesionless soils related to single footing, combined footing, raft foundation etc, concept of differential settlement, factors and causes for differential settlement, standard requirement of total as well as differential settlement, service loads, proportioning of footing for uniform settlement.

**Unit III :**

**Chapter: 5** Pile foundation: Classification of piles and their uses, static analysis, formula for determination of pile capacity for driven and bored pile in sand and in clay, dynamic pile formula, Negative skin friction, factor affecting it, piles in groups and their capacity, group efficiency, factors affecting group efficiency, settlement ratio, behaviour of group of pile in sandy and in clayey solids, pile load test, effect of pile cap. Criteria for spacing and depth of piles. IS design criterion for under-reamed pile in clay and sands, Total
and differential settlement related to single pile and group of piles in sandy and in clays soils.

Unit IV : [7 Hrs]
Chapter: 6 Well foundation: Component and their function, sinking of well, types of force system, and their computation, design criteria for various components of wells, tilting and shifting of wells, methods of correcting tilting and shifting. Bearing capacity of well foundation as per IS method. Cofferdam: Its purpose, various types, their suitability.

Chapter: 7 Raft foundation: Its purpose, advantages, situation, classification of raft, criteria for rigid and flexible raft, design of raft foundation, concept of floating foundation.

Unit V : [8 Hrs]
Chapter: 8 Slope Stability: Slopes, uses and failure of slope, stability analysis of infinite and finite slope in sand, clay and \( c'\) soil; Tailors stability number, Swedish stability number, Friction circle method, Bishop Method, Concept of effective stress analysis.

Chapter: 9 Earth Pressure: Earth Pressure at rest, active and passive, Stages of plastic equilibrium Rankin’s and Coulomb’s theory of active and passive earth pressure on retaining wall. Influence of surcharge, water table, wall friction, Rebhann and Culmanns simple graphical methods

Unit VI : [6 Hrs]
Chapter: 10 Ground Improvement: Methods of soil stabilization and use of admixture (lime, cement, fly ash) in stabilization, Basic concept of reinforced soil, use of Geosynthetics material as a reinforcement, Geotextiles, Vibro-flotation, sand column/stone column, preloading.

Text Books:

Reference Books:

BCEP 318 : GEOTECHNICAL ENGINEERING – II (0-0-2-1)
Total Hours: 20
Evaluation scheme: Practical [2P]
List of Practical:
(Any Ten from the following List)
1. Auger boring and soil sampling
2. Standard Penetration test
3. Dynamic cone penetration test
4. Determination of pore water pressure
5. Panning site investigations for a real life problem- project mode tests.
6. In situ permeability test
7. Determination of Free swell index and swell potential
8. Determination of Swelling pressure of given soil sample.
9. Unconfined compression test
10. Direct shear test.
13. Vane Shear Test
14. Opened Ended Experiments

BCEL 321: STRUCTURAL ANALYSIS-I (3-1-0-4)
Total Hrs.:45

Course Prerequisites: Strength of Materials
Co-Prerequisites: ---

Course Objectives:
1. To study basic concepts of analysis of structural components.
2. To study the behavior of structural components under the various combination of loads.
3. To study various methods for the analysis of indeterminate structure.

Course Outcomes:
Student shall be able to
1. Understand the basic concept of structural analysis.
2. Identify the behavior of structural components subjected to various loadings.
3. Analysis the indeterminate structure using various methods of structural analysis.

Unit – I [7 Hrs]
Static determinacy of structure Analysis of loads on simply supported beams with concentrated and uniformly distributed loads, maximum B.M. and S.F. Influence lines for reactions, bending moments and shear forces in simply supported beams, cantilevers and beams with overhangs. Influence lines for forces in members of simple trusses and for BM and SF in panels of simple trusses.

Unit – II [8 Hrs]
Strain energy method as applied to the analysis of redundant frames and redundant trusses up to two degrees. Determination of deflection of trusses. Willot Mohr digram, Castiglanos theorems, Maxwells reciprocal theorem. Battis theorem.

Unit – III [9 Hrs]
Bucking of Columns and beams, Euler’s and Rankines formula. Analysis of Two- Hinged arches, S.F. and normal thrust, parabolic arches.

Unit – IV [7 Hrs]
Analysis of fixed and continues beams by theorem of three moments effect of sinking of support.
Analysis of continues beams and simple portals (Non sway) using Moment Distribution methods. Introduction flexibility method and compatibility method for trusses, beams and frames.

Slope deflection method as applied to indeterminate beams & continues beams portal frames, frame with inclined legs up to 3 degrees of freedom.

Text Books:

Reference Books:

MBL103: GENERAL PROFICIENCY-III: Hobby classes
For syllabus: please refer electronics engg. Departments syllabus in fourth semester.

SEMESTER -V

BCEL219 : ENVIRONMENTAL ENGINEERING – I (3-0-0-3)
Total Hrs: 40 Hrs
Course-Prerequisites: Applied Chemistry
Co-Requisites: Environmental Engineering- I (PR)
Course Objectives:  
1. To understand various parameters and treatment units
2. To learn different types of water demand, sources and intake structures
3. Learning about water quality and water treatment processes

Course Outcomes:
Student shall be able to
1. Design certain components of water supply system
2. Understand methods of distribution of water.
3. Understand significance of good quality of water and methods of treatment to achieve required quality of water.

Unit I
Introduction Importance and necessity of water supply scheme.

Water demand: Types of demand, empirical formulae, factors affecting per Capita demand, variation in demands, design period and population forecasting methods and examples.

Sources of water: rain water, Ground water – springs, infiltration galleries, Dug wells, tube wells, Surface water – stream, lake river, impounding reservoirs, ponds.

Intake structures: Location types – river, lake, canal reservoir etc.

Unit II: [04 Hrs]
Conveyance of water: types of pipes joints, fittings.

Hydraulic design aspects: Losses due to Friction Darcy – Weisbach, Mannings, Hazen William formulae and problems on these.

Rising main and pumps: Classification working merits and demerits selection of pumps.

Unit III: [08 Hrs]
Water quality: General idea of water borne diseases, Physical, Chemical, and bacteriological characteristics of water, Standards of drinking water.


Aeration: Purpose, types of aerators.

Coagulation and Flocculation: Definition, Principals, types of coagulants and reactions, coagulant doses, types of mixing and flocculation devices.

Unit IV: [08 Hrs]
Sedimentation: Principles types of setting basins, inlet and outlet arrangements.

Clariflocculator: Principles and operation.

Filtration: Mechanism of filtration, types of filters RSF, SSF, pressure filters, elements of filters UDS, design aspects filter sand specification – ES, UC, operational problems in filtration.

Unit V: [07 Hrs]
Disinfection: Purpose Mechanism, criteria for good disinfectant various disinfectants their characteristics, disinfection by chlorination using different forms of chlorine.

Distribution systems: Requirements for a good distribution system, methods of distribution systems distribution systems and layouts of DS, appurtenances in water distribution system.

Storage reservoirs for treated water: Types, capacity of reservoir, mass curve.

Unit VI: [06 Hrs]
Municipal solid waste management: Generation sources, composition, Quality, Methods of Collection, transportation, treatment and disposal, Recycle, Reuse.

Examples on simple hydraulic design of pipes, estimation of population and water quality, plain sedimentation tanks, cascade Only simple sizing of units no detailed design.
Text Books:

Reference Books:

BCEP219: ENVIRONMENTAL ENGINEERING—I (0-0-2-1)
Total Hrs: 20 Hrs

List of Practical:
(Any Ten from the following)
1. Determination of pH of given water sample
2. Determination of Conductivity of given water sample
3. Determination of Chloride in given water sample
4. Determination of Solids in given water sample
5. Determination of Turbidity of given water sample
6. Determination of Alkalinity – Acidity of given water sample
7. Determination of Dissolved Oxygen of given water sample
8. Determination of Hardness of given water sample
9. Determination of Available Chlorine in given water sample
10. Determination of Residual Chlorine in given water sample
11. Determination of sulphates by spectrophotometer.
12. Determination of optimum dose of coagulant by performing jar test.
13. To perform Bacteriological Plate count and MPN tests for given water sample
14. Determination of COD value for given wastewater sample
15. To Design water treatment Unit by using software.

BCES313: SURVEYING-II (3-1-0-4)
Total Hrs: 45 Hrs
Course-Prerequisites: Surveying- I
Co-Requisites: Surveying- II (PR)
Course Objective: -
1. To determine horizontal and vertical distances of points at angular observations
2. To design the curve when change of directions takes place in roads, railways.
3. To prepare plans or maps from photographs taken at suitable camera station.

Course Outcomes:
Student shall be able to
1. Determine horizontal and vertical distances of points at angular observations
2. Design the curve when change of directions takes place in roads, railways
3. Prepare plans or maps from photographs taken at suitable camera

Unit I: Tachometry [08 Hrs]
Stadia method ,fixed hair and movable hair and tangential method, formulae for distance and reduce level determination. Theory of anallatic lens. Beaman’s stadia arc, Auto reduction tacheometer such as Jeffcot Hammer fennel.

Unit-II [08 Hrs]
Curves :- Classification ,degree of curves, elements of circular and compound curves, theory and methods of setting out simple curves, Instrumental method of setting out compound curves, vertical curves, their types and setting out method of vertical curves.

Transition Curves: Ideal transition curves, characteristics methods of determination of length, Elements of different type and method of setting out.

Unit-III: [06 Hrs]
Triangulation: Principle, classification of triangulation system, triangulation figures, their choice of station, phase of signals , towers, satellite station, reduction to center, field work, Reconnaissance, Indivisibility, angular measurement
Base line and its measurement, Basenet ,extension of Basenet , corrections to base line measurement, adjustment of field observation ,errors in observation, method of least square, weighted observation, figure adjustment (Triangle only)

Unit-IV: [08 Hrs]
Element of Photogrammetry: - Basic definition, terrestrial and aerial photography, scale of vertical photograph, Relief and relief displacements, height from parallel measurements, fights planning, photographs required.

Field Astronomy: Elements of spherical trigonometry, Napier’s rules of circular parts, celestial sphere, ecliptic, circumpolar stars, astronomical terms, Astronomical triangle ,co-ordinate systems.

Unit-V: [07Hrs]
Remote sensing: Introduction , definition, remote sensing system, advantages over conventional
system, energy interaction in the atmosphere, Indian remote sensing satellite series and their characteristics.

GIS & GPS: Components of geographical information system (GIS), advantages and disadvantages, global positioning system (GPS), Introduction, definitions, GPS receivers, antenna, advantages of GPS.

Unit-VI: [08Hrs]

Hydrographic Surveying: necessity, controls, shore line surveys, gauges, sounding equipments and procedure of taking soundings, method of location of sounding, three point problem in hydrographic surveying, analytical and graphical methods, station pointer.

Underground Surveying: Surface alignment, correlation of surface and underground surveys; weisbach triangle, transferring levels underground.

Text Books:

Reference Books:

BCEP 313: SURVEYING-II LAB.

List of Practical:
1. Use of equipments
2. Determination of constant of Tacheometer.
3. Determination of elevation of point by Tacheometric surveying.
4. Determination of elevation of point and horizontal distance between them by Tacheometric survey.
5. Determination of gradient of given length if road by Tacheometric survey.
6. Setting out of simple circular curve by offset from chord produced method.
7. Setting out of simple circular curve by Rankine method of tangential angle.
8. Setting out of simple transition curve by tangential angle method.
9. Based line measurement.
10. Use of Total Station.
11. A) SURVEY CAMP (On any of the following topics)
   1. Road Project with horizontal curves.
   2. Irrigation Project
   3. Water Supply Project

BCEL420: STRUCTURAL DESIGN-I (4-0-0-4)

Total Hrs: 45

Course-Prerequisites: Concrete Technology

Co-Requisites: Structural Design - I (PR)

Course Objective:
1. To understand phenomenon’s of design concepts and learning various codes related to RCC design.
2. To determine the structural behavior of steel and concrete.
3. To apply conventional methods for design structural components of building.

Course Outcomes:
Student shall be able to
1. Understand the basic methods of structural design of Reinforced cement concrete.
2. Identify the structural properties of materials i.e. steel and concrete.
3. Planning and design of various structural components of building, structural Design I

UNIT I: [7 Hrs]


UNIT II: [7 Hrs]


4. Limit State of serviceability:
   (i) Causes and control of cracking: Crack in plastic concrete at early age, Cracks due to temperature and shrinkage, restrain induced cracks, cracks due to loading. Needs for crack width control.
   (ii) Moment – curvature relationship, deflection control of beams and one way slabs. (no numerical calculations)

UNIT III: [7 Hrs]

5. Limit state of collapse in flexure: Analysis and design of singly reinforced rectangular section. Balanced failure mode, primary tension failure mode and primary compression failure mode.

6. Limit state of Collapse in Flexure: Analysis & design of the Tee & L-beam section.

7. Limit state of Collapse in Shear & Bond: Design of beam for shear, shear span, post cracking resistance, shear mechanism
approach, shear failure modes and collapse loads, interaction of shear, flexure and axial force, Check for bond.

UNIT IV: [8 Hrs]
8. Limit state of collapse in compression: Analysis & design of short axially loaded column. Columns subjected to uni-axial bending, use of interaction curves.

UNIT V: [8 Hrs]
10. Design of circular water tank with roof slab/ dome resting on ground by Approximate method/IS code method.
11. Design of rectangular water tank with one–way roof slab resting on ground by approximate method/IS code method.

UNIT VI: [8 Hrs]
12. Design of one –way, simply supported, single span and cantilever slabs and continuous slab / beam with IS coefficients.
13. Design of two way slab (For discontinuous edged only)
14. Design of Dog –Legged /Open Well Staircases

BCEP420: STRUCTURAL DESIGN-I

List of Practical:
(Any Six from the following)
1. Stress strain behavior of RCC Section by LSM
2. Design of One way Continuous slab
3. Design of two way slab (For discontinuous edged only)
4. Design of Rectangular pad / slopped footing
5. Design of Circular water tank with roof slab/dome resting on ground.
6. Design of Rectangular water tank with one –way roof slab resting on ground.
7. Dog- legged / Open well staircase.
8. One field visit and its report in the journal

Text Books:

Reference Books:

BCEL315: Building Design and Drawing (2-0-0-2)
Total Hrs: 25

Course-Prerequisites: Building Construction & Materials

Co-Requisites: Building Design & Drawing (PR)

Course Objective: -
1. To understand importance of Building drawing as engineers language
2. To plan building as per owner’s requirements and Building byelaws
3. To develop drawings to scale with location site and block plan with AutoCAD software

Course Outcomes:
Student shall be able to
1. Read and understand civil engineering drawings.
2. Draw building drawing as per functional requirements.
3. Understand the planning & drawing with appropriate scales using AutoCAD software.

Unit I: [05]
Auto CAD (Computer Aided Drafting)
a) Specifying Distance and coordinates. Polar coordinates, relative Cartesian coordinates. Interpreting curser modes and understanding prompt, choosing commands options, selecting objects, editing and grips. Setting up work area, measurement systems, scales factor mode as drafting tools. Symbols, blocks layers. Templates copying object, editing lines, changing length of object. Geometric construction of line and point parallel line, perpendicular lines, breaking lines, dividing lines, fillets, chambers, circles, tangent, arcs, curves through points, breaking polygons, solid shape ellipse.

Unit II: [05]
Hatch patterns boundary, adding text, Text formatting styles, size of text and scale of drawing, dimensions style, unit heights, locations, arrow style Polyline, editing, creating splice curve, dividing in segments, filling in solid area, Printing and plotting drawing, out put device paper size, orientation, control on scale and location.

Unit III: [04]
Method of Drawing:
Importance of Building drawing as Engineers language in construction & costing Selection of scales for various drawings. Thickness of line Dimensioning, first angle and third angle method of projection, Abbreviations and conventional representations as per IS 19 [06]2. Free hand dimensioned sketches stones of various building elements Importance in Civil Engineering.

Unit IV: [04]
Developing working drawings to scale as per IS 19 [06]2 from the givens sketch design and general specifications for terraced and pitched roofs in AutoCAD. Developing submission drawings to scale with location site and block plan complete in AutoCAD.

Unit V: [04]
Designing of Buildings
Introduction: Site requirements, requirements of owner and Building byelaws. Climate and design consideration, orientation, recommendations of CBRI. General principles of planning with emphasis on functional planning. Graph paper design (line plans) based on various requirements for residential, public, education and industrial buildings.

Unit VI: Perspective Drawing: [03]
Two point perspective of Residential building neglecting small elements of building such as plinth offset, chajja projections etc.

BCEP315: BUILDING DESIGN & DRAWING [0-0-4-2]
Total Hrs : 20
1. Working drawing of residential single storied building of terrace and pitched roofs with foundation plan of load bearing structure. (Two assignment)
2. Submission drawing of single storied residential building (framed structure) with access to terrace including all details and statements as per the local bye-laws. (One assignment)
3. Working drawing of multistoried Public / Educational / Health / Community / Industrial building including structural details and layout of services. (One assignment).
4. Two point perspective of the single Residential building neglecting small building elements. (Two assignment – pitched & terraced roof)
5. Minimum 30 free hand self-explanatory dimensioned sketches of various building elements in sketchbook.
6. Line plans of various types of buildings e.g. public / educational / industrial / hospital / community on graph papers (Eight assignments)
7. Submission drawing of 02 (G+1) storied residential building framed structure including all details and statements as per the local bye laws. (One assignment)
8. One compulsory field exercise.

Text Books:

Reference Books:
2. George Omura, Mastering Autocad 1, 1st Edition, BPB Publications, New Delhi, 2004

BCEP 220: BASIC TRANSPORTATION ENGINEERING [3-0-0-3]
Total Hrs:40Hrs

Course-Prerequisites: ----

Co-Requisites: Basic Transportation Engineering (PR)
Course Objective: -
1. To understand the various modes of transportation & the transportation system.
2. To identify all elements of a highway cross-section and effect of each element on highway design.
3. To understand various types of pavements, their structures, and pavement design procedures as per IRC guidelines [06Hrs]

Course Outcomes:
Student shall be able to
1. Deal with the different methods of road construction, highway development in India and ongoing Highway Development Programmes.
2. Understand concept of Geometric design of roads and various aspects of traffic loads.
3. Identify the defects in flexible and rigid pavements and evaluation of pavement failure and strengthening.

Unit I: History of road development, Classification, alignment and surveys [05Hrs]
Historical development of road construction, Fields of Transportation Engineering: Role of transportation in society; Modes of transportation.
Highway Engineering: Road types and pattern; Road alignment; Controlling factors and surveys for road alignment. Classification of highways cross section of roads in urban and rural areas - definitions of various cross sectional elements - requirements and factors controlling alignment of roads, engineering surveys for highway location.

Unit II: Geometric design of highways: [08Hrs]

Unit III: Pavement Design: [08Hrs]
Types of Pavements & characteristic, Design parameters, Axel & Wheel load, tyre pressure, ESWL for dual Wheels, repetitions, Group Index & CBR method of flexible pavement design. Analysis of load & temperature stresses of rigid pavement, joints.
Materials: Subgrade Soil – AASHO Classification, group index, Subgrade soil stabilization. CBR, aggregates physical & Mechanical properties & tests bituminous materials classification sources properties and tests. Cutback & Emulsions, IRC/IS standards, Introduction to Geotextiles.
Construction & Maintenance:
IRC, MOST specifications for quality & quantity of materials, techniques, tools and plant for the Earthwork, sub base, base and wearing/surfacing course of flexible pavements with gravel, WEM, stabilized Bituminous & Concrete as Construction materials, Drainage, shoulders, maintenance & repairs, Choice of construction.

Unit IV: [08Hrs]
Bridges - General
Components, classification and identification, Data Collection site selection, Economic Span
Hydrology: Estimation of flood, discharge, water way, scour depth, depth of foundation, Afflux, clearance and free board.

Bridges: Loads, Forces, Stresses:

Unit V: [04Hrs]
Bridges Superstructure
Different Structural Forms, culverts, causeway, minor and major bridges, suitability, precast post tensioned and segmental construction, launching operation, systems, bearing, Architecture.
Methods & Techniques of rating of existing bridges, Inspection, Repairs, maintenance, corrosion causes and prevention, Aesthetics.

Unit VI: [07Hrs]
Railways
Railway Signaling and interlocking: Objects of signaling principles of signaling.

Text Books:

Reference Books:

BCEP220: BASIC TRANSPORTATION ENGINEERING
(0-0-2-1) Total Hrs :20

List of Practical:
1. Test on aggregates (Any 05)
2. Determination of flakiness index of aggregate.
3. Determination of elongation index of aggregate.
4. Determination of specific gravity of aggregate.
5. Determination of crushing value of aggregate.
7. Determination of impact value of aggregate.
8. Determination of crushing value of aggregate.

MBL 104 GENERAL PROFICIENCY-IV (Advanced
Communication Skill)
For syllabus: please refer electronics engg. Departments syllabus in fifth semester

SEMESTER VI

BCEL 314: STRUCTURAL ANALYSIS-II (3-1-0-4)
Course-Prerequisites: Structural Analysis- I
Co-Requsites: Structural Analysis- II (PR)
Course Objective: -
1. To understand the concept, principles & need of analysis of indeterminate structures
2. To study the analysis of continuous beams and frames subjected to lateral sway
3. To study approximate methods of analysis for portal frames

Course Outcomes:
Student shall be able to
1. Understand the concept, principles & need of analysis of indeterminate structure
2. Analyze the different types of beams and portal frames using different methods
3. Analyze multistory buildings using an iterative method

UNIT I : [8 Hrs]
Kani’s Method applied to symmetrical and unsymmetrical frames with sway (Up to single bay single storey)

UNIT II : [7 Hrs]
Approximate method of Structural analysis for multi-storeyed frames with lateral loads (Portal and Cantilever method), Approximate methods for vertical loads i.e. Substitute frame method etc. (Max. three bay three storey)

UNIT III : [8 Hrs]
Column Analogy method, Application to beams, Calculations of Stiffness factors and carry over factors for non-prismatic method, Analysis of non-prismatic fixed beams.

UNIT IV : [8 Hrs]
Introduction to Flexibility Method of structural analysis, influence coefficient, Choice of base determinate structure and redundant forces, compatibility equations. Hand solution of simple beam problems.
UNIT V:  [8 Hrs]
Strain energy method applied to simple composite structures (Simple problems), Introduction to basic theory of elasticity, Concept of stress, strains, strain displacement relationship, equation of equilibrium, boundary conditions, generalized Hook's law, plane stress and plane strain problem Theory of photo elasticity applied to beams. Study of various types of strain gauges, Analysis of strains by strain gauges.

UNIT VI:  [6 Hrs]
Moment distribution applied to frames with sway (up to single storey two bay)

Text Books:

Reference Books:

BCEP314: STRUCTURAL ANALYSIS-II  (0-0-2-1)
List of Practical:
(Any ten from the following List)
1. To calculate & compare the buckling loads for each column model with different end conditions
2. To determine experimentally the horizontal displacement of the two hinged arch and verify the same with theoretical value
3. To determine the sway of a fixed end portal frame under different loading conditions
4. To find the value of flexural rigidity (EI) for a given beam and compare it with theoretical value
5. To verify clerk Maxwell’s reciprocal theorem for beam
6. To determine the deflection of a pin connected truss analytically & graphically and verify the same experimentally
7. To determine material fringe value by using diffused light research polariscope
8. To verify the moment area theorem regarding the slopes and deflections of the beam
9. To determine the moment required to produce a given rotation (rotational stiffness) at one end of the beam when the other end is pinned
10. To determine the horizontal thrust and to draw the ILD for horizontal thrust
11. To verify clerk Maxwell’s reciprocal theorem by means of the truss
12. To verify the Muller Breslau theorem by using Begg’s deformator set.
13. To verify strain in an externally loaded beam with the help of a strain gauge indicator and to verify theoretically
14. To measure the strain in the simply supported beam with the help of Electrical resistance strain gauge
15. To determine the stress pattern and material fringe value of beam using Photo elastic method.

BCEL316: STRUCTURAL DESIGN-II  (4-0-0-4)
Total Hrs: 50
Course-Prerequisites: Structural Analysis-I
Co-Requisites: Structural Design –II (PR)
Course Objective: -
1. To understand the concepts and different aspects to be considered for design of steel structures.
2. To study the IS 800 specification s used in steel designing
3. To design the various structural components as per the codal provision.

Course Outcomes:
Student shall be able to
1. Apply the basics of design for Steel Structures.
2. Understand the structural properties for utilization of various standard steel sections.
3. Design various structural components of steel structure.

UNIT I:  [10 Hrs]
A) Steel as a structural material, various grades of structural steel, properties, various rolled steel sections (including cold formed sections, structural pipe tube sections) and their properties. Introduction to I.S. 800-2007.

UNIT II:  [10 Hrs]
A) Design of axially loaded members (a)Tension members (b) Compression members
Design of roof truss: Load assessment for DL, LL and WL.
B) Moment resistant bolted and welded connection. (bending and torsion)
C) Design of connection Beam to beam, beam to column-framed connection

UNIT III:  [15 Hrs]
A) Design of simple built up beams : Laterally restrained and Laterally unrestrained, (symmetrical as well as unsymmetrical section). Curtailment of flange plates.
B) Design of welded plate girder, concept of gantry girder.

UNIT IV:  [15 Hrs]
Design of single rolled steel section column subjected to axial load and biaxial moment including base design. Design of axially loaded built up columns. Laced and Battened (Column bases slab base gusseted base moment resistant bases)

Text Books:

Reference Books:

BCEP316 : STRUCTURAL DESIGN-II (0-0-2-1)
Total Hrs : 20

List of Practical:
Any Six Design with A2 Size Sheet
1. Design of Tension Member
2. Design of Compression Member
3. Design of Laterally Restrained Beam.
4. Design of Laterally Unrestrained Beam.
5. Design of column with lacing (Single Lacing & Double Lacing).
6. Design of column with Battening.
7. Design of Plate Girder.
8. Design of connection Beam to beam, beam to column-framed connection.

BCELP317: ENVIRONMENTAL ENGINEERING-II (3-0-0-3)
Total Hrs: 41 Hrs

Course-Prerequisites: Environmental Engineering - I
Co-Requisites: ---
Course Objective:
1. To learn wastewater treatment design and storm water, domestic sewage etc. flow system.
2. To understand wastewater characteristic, sampling of sewage, physical, chemical and biological characterization.
3. To learn latest trends in environmental management and air pollution

Course Outcomes:
Student shall be able to
1. Understand complete working of sewage treatment plant including difference with industrial wastewater treatment plant and its conveyance.
2. Understand importance of effective sewage collection and its characterization.
3. Understand importance of air pollution control including recent methods to control it.

Unit I: [06Hrs]
Introduction and objective of Waste water treatment, Quantity of storm water, domestic sewage, variation of sewage flow systems of sewerage - separate combined and partially combined layouts of sewerage system, capacity of sewers, design of sewers. Laying out of circular sewers-Boning rod and sight rail method, Testing & maintenance of sewers.

Unit II: [08Hrs]

Unit III: [08Hrs]

Unit IV: [07Hrs]
Low cost waste treatments - Oxidation ponds, Aerated Lagoon, Treatment and Disposal of sludge - Digestion of sludge, sludge disposal. Septic tank, working and design, Disposal of septic tank effluent. Disposal of sewage on land and in stream. Self purification capacity of stream.

Unit V: [08Hrs]
Air Pollution:
Introduction, Air pollution sources and air pollution episodes. Effect of Air Pollution basic Concept. Metrology and transport of air pollution. Air pollution control management. Legislation and emission standards.

Unit VI: [05Hrs]

Text Books:

Reference Books:

BCEL319: WATER RESOURCES ENGINEERING-II (3-0-0-3)
Total Hrs: 45

Course-Prerequisites: Water Resources Engineering-I
Co-Requisites: Water Resources Engineering- II (PR)

Course Objective:
1. To understand necessity and importance of irrigation Engineering.
2. To learn about different types of dams & spillway with their working operations and their general design
3. To study various canals and design of canal structures

Course Outcomes:
Students shall be able to
1. Demonstrate the knowledge of irrigation & assessment of irrigation.
2. Apply the engineering concepts for hydraulic design of dam & spillways.
3. Design & analyze the canal & canal structure.

Unit I: [06Hrs]
GENERAL:
Necessity and importance of irrigation Engineering; Benefits & ill effects of irrigation; Classification of irrigation; General principles of flow, lift, perennial, inundation irrigation systems; Comparative study of sprinkler and drip irrigation systems. Lift Irrigation, components and general layout.

WATER REQUIREMENT CROPS:
Suitability of soils for Irrigation; Standards of irrigation water; PET-R method of crop water requirements; Depth & frequency of irrigation; definitions of field capacity, wilting point, available moisture, duty, delta, GCA,CCA, kor depth, base period, outlet factor, capacity factor, time factor, root zone depth: Relation between duty & delta; Factors affecting duty; Principal crops in India; Crop rotation; Methods of assessment of irrigation water.

Unit II: [04Hrs]
RESERVOIR PLANNING:
Selection of site for Reservoirs: Engineering surveys, Geological and Hydrological investigations; Fixing of LWL, FT, HFL, TBL; Different storage zones, in reservoirs; Determination of storage capacity by mass curve method; Reservoir sedimentation; life estimation of reservoir by Brunes method; Organization & Administration of irrigation projects. Reservoir operation and scheduling.

DAMS:
Classification of Dams as per use, hydraulic design and materials; Factors governing selection of type of Dams.

Unit III: [08Hrs]
GRAVITY DAM:
Definition; forces acting on gravity dam; stability requirements; Theoretical & practical profile of gravity dam; Low & High dam; Galleries.

EARTHEN DAMS:
Types of earthen dam; Description of component parts of earthen dams foundation, cut of trench, rock toe, hearting, central impervious core, pitching and chipping turfing; Seepage through body of earthen dam and drainage arrangements; Failure of earthen dams, plotting of phreatic line for homogeneous earthen dams with horizontal filters; Stability of foundation against shear.

Barages, Types of Barages, Advantages/Disadvantages.

Unit IV: [10Hrs]
SPILLWAYS:
Types of spillway with there working operations; General principles of design of ogee spillway; Spillway gates – Vertical lift, radial, rolling and drum; Energy dissipation methods d/s of spillways, Hydraulic jump, defating high velocity flow.

DIVERSION HEAD WORKS:
Component parts of diversion headwork’s – Fish ladder, guide wall, devide all, silt excluder and silt ejector; Causes of failure of weirs on permeable foundation; Bligh’s Creep theory; dr. khosla’s theory for design of weirs on permeable foundations.

Unit V: [08Hrs]
CANALS
(A) GENERAL:
Types of canal; Alignment of canal; Cross section of irrigation canals; balancing depth; Schedule of area statistics; Losses in canals

(B) CANALS IN ALLUVIAL, SOILS:
Kennedy’s silt theory – Design procedure, silt supporting capacity, drawbacks; Lacey’s silt theory- Definition of initial final and permanent regime channels, Lacey’s Regime equation, channel design procedure, drawback’s; Garret’s diagram for channel design.

(C) LINED CANALS:
Design procedure; Types of lining; relative merits and demerits of canal lining; Economics of canal lining.

Unit VI: [09Hrs]
CANAL STRUCTURES:
(A) CANAL REGULATION WORKS:
Only theoretical aspects of location, objects, classification, components and schematic section of Head Regulator, Cross regulators, canal escapes, Canal falls and canal outlets.

(B) CROSS DRAINAGE WORKS:
Only theoretical aspects of location, objects, classification, components and schematic section of aqueducts, siphon aqueducts, super passage, canal siphon, inlets outlets and level crossings.
WATER LOGGING AND LAND DRAINAGE:
Causes, effects, preventive measures of water logging, Types of drains, Layout of tile drain systems; flow of groundwater to drains

RIVER TRAINING WORKS:
Definition; Classification; theoretical aspects of river training works like as Guide banks, Groynes and Spurs, Bank protection.

Text Books:

Reference Books:

BCEP319: WATER RESOURCES ENGINEERING-II (3-0-0-3)
Total Hrs: 20

List of Practical:
1. To determine Capacity of reservoir by reservoir planning.
2. To determine Life of reservoir.
3. Design of Gravity Dam.
4. Design of Earthen Dam.
5. Design of Lined canals
6. Design of Unlined canals
7. Design of Lift Irrigation Scheme.
8. Drawing of various canal structures.
9. Site visit to irrigation project – Detail report should be submitted.

BMEL 318: ELECTIVE I- OPERATIONS RESEARCH & MANAGEMENT (3-0-0-3) Total Hrs: [50]
Course-Prerequisites: Mathematics - III
Co-Requisites: ---

Course Objective:
1. To study operational research methodology and its application to engineering
2. To introduce students to use quantitative methods and techniques for effective decisions–making;

Course Outcomes:
Student shall be able to
1. Identify and develop operational research models from the verbal description of the real system

2. Understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type

Unit I: [06Hrs]
Introduction
OR methodology, Definition of OR, Application of OR to engineering and Managerial problems, Features of OR models, Limitation of OR.

Unit II: [07Hrs]
Linear Programming
Definition, mathematical formulation, standard form, solution space, solution – feasible, basic feasible, optimal, infeasible, multiple, optimal, Redundancy, Degeneracy. Graphical and simplex methods, Big M Method , formulation of Dual of LPP.

Unit III: [06Hrs]
Transportation & Assignment Problems

Unit IV: [07Hrs]
Project Planning
Project Management : Drawing of Network, CPM & PERT, Probability of completion of project, Cost analysis of project, Allocation & updating of Network.

Unit V: [07Hrs]
Inventory control & simulation

Unit VI: [07Hrs]
Queuing Theory
Waiting line situations, introduction & application of queuing models, classification of queuing models, problems on Single Server Queuing models ( M/M/1 ) model.

Text Book:
1. Operation Research by Ashkhedkar & Kulkarni

Reference Books:
(i) Operation Research by Hira & Gupta
(ii) Operation Research by J.K. Sharma
(iii) Operation Research by Ashkhedkar & Kulkarni
(iv) Operation Research by Vohra N D
(v) Operation Research by Liberman
(vi) Operation Research by Liberman
(vii) Operation Research by Manohar & Mahajan
BCEL422: ADVANCED STRUCTURAL DESIGN (3-0-0-3)  
Total hrs: 42  
(ELECTIVE-I)  
Course-Prerequisites: Structural Design -I  
Co-Prerequisites: ---  
Course Objective: -  
1. To study the various limit state of collapse, flexure, torsion, deflection and interaction of torsion, shear and flexure.  
2. To design structural components like two way slab, bioaxial column, retaining wall and combined footing by limit state method as per IS 456-2000.  

Course Outcomes:  
Students shall be able to  
1. To understand the various limit state of collapse - flexure, torsion, deflection and interaction of torsion, shear and flexure.  
2. To design structural components like two -way slab, bioaxial column, retaining wall and combined footing by limit state method as per IS 456-2000.  

UNIT – I:  
[10 Hrs]  
Limit state of collapse and flexure: Analysis and design of doubly reinforced rectangular and Tee sections.  
Limit state of collapse in torsion: Concept of interaction of torsion, shear and flexure. Analysis and design of rectangular section for torsion shear and flexure.  
Limit state of serviceability: Deflection calculations for beams.  

UNIT – II:  
[8 Hrs]  
Analysis and design for columns subjected to biaxial moments. Design of long columns  

UNIT – III:  
[8 Hrs]  
Design of RCC Two way slab with various end conditions using IS 456 :2000 coefficients  

UNIT – IV:  
[8 Hrs]  
Design of combined footing (Rectangular footing and Trapezoidal footing)  

UNIT – V:  
[8 Hrs]  
Design of RCC cantilever and counter-fort retaining walls.  

Text Books:  

Reference Books:  


BCEL424: EARTHQUAKE RESISTANT STRUCTURES (3-0-0-3)  
Total Hrs: 40  
(ELECTIVE-I)  
Course-Prerequisites: Structural Design -I  
Co-Prerequisites: ---  
Course Objective:  
1. To understand earth geology, movements of the plates, earthquakes  
2. To Predict the Dynamic Behavior of simple structural systems,  
3. To understanding of structural dynamics of simple systems subject to harmonic, impulse and/or arbitrary loading  

Course Outcome:  
Student shall be able to:  
1. Understand earth geology, movements of the plates, earthquakes  
2. Predict the Dynamic Behavior of simple structural systems,  
3. Develop an understanding of structural dynamics of simple systems subject to harmonic, impulse and/or arbitrary loading  

UNIT – I:  
[6 Hrs]  
The Earth and its interior, Circulations, plate tectonics, faults, seismic waves, Strong ground motions, characteristics of strong ground motions.  

UNIT – II:  
[6 Hrs]  
Magnitude, Intensity, Richter scale measurement of earthquake, other modern methods of earthquake measurement, Numerical Problems  

UNIT – III:  
[6 Hrs]  
Concept, Seismic zones in India, Seismic design philosophy for buildings. Earthquake Resistant Planning of structures: Guidelines for achieving efficient earthquake resistant building, I.S. selection of sites, importance of architectural features in earthquake resistant building, twisting of building, geotechnical design considerations  

UNIT – IV:  
[6 Hrs]  
Introduction to IS 1893-2002, Structural response to earthquake, Seismic analysis of multistoried frames by equivalent static analysis method, Introduction to IS 13920, design strategy, strength, ductility of reinforced concrete members  

UNIT – V:  
[8 Hrs]  
Special aspects in Multi-storey buildings, Effect of torsion, flexible first story, P-delta effect, soil-structure, interaction on building response, drift limitation
UNIT VI: [8 Hrs]
Seismic effects, resistance and ductile detailing in RC building elements: Beams, Columns, Beam-Column joints, footing, shear walls, seismic design considerations for open ground storey, short column effect

Text Books:

Reference Books:

BCEL421: GEOLOGY & EARTH SCIENCE (ELECTIVE-I)
(3-0-0-3) Total Hrs:40 Hrs
Course-Prerequisites: ---
Co-Requisites: ---
Course Objective:
1. To understand processes of Rock weathering, formation of soils and different profiles of soil and rocks
2. To study methods of determining intensity and magnitude of earthquakes

Course Outcome:
Student shall be able to
1. Use knowledge of rock & soil mechanics required for design of civil engineering structures
2. Study the effect of earthquake on civil engineering structures

Unit I: [07 Hrs]
Physical Geology: Geomorphic processes-Rock weathering-Formation of soils soil profiles-soils of India – Geologic work and engineering significance of rivers and oceans

Unit II: [07 Hrs]
Dynamic Geology: Interior constitution of the earth-Various methods to study the interior-crust, mantle, core-lithosphere-asthenosphere-major discontinuities-Moho, Gutenberg, Lehmann- composition of different layers-sima & sial.
Plate tectonics: Lithospheric plates-diverging, converging and transform boundaries-their characteristic features-midoceanic ridge, benioff zone and transform faults-significance of plate tectonic concept.

Unit III: [06 Hrs]

Unit IV: [06 Hrs]

Unit V: [07 Hrs]
Structural Geology: Definition-outcrop-stratification-dip and strike. Folds-definition- parts of fold-classification-recognition of folds in the field- Faults-definition- parts of a fault-classification-recognition in the field-effects of faulting and subsequent erosion on outcrops. Joints-definition-classification. Unconformites-definition-classification recognition in the field. Effects of all the 70 above described structures in the major engineering projects like reservoirs, dams, tunnels and other important structures.

Unit VI: [07 Hrs]
Hydrogeology: Groundwater table-abundance and advantages-aquier acquiclude- acquifuge-artesian conditions and artesian wells-cone of depression- perched water table.
Recommended field work: Field trip to quarries or geologically significant places to learn - in site character of rocks in quarries/outcrops-measuring strike and dip of a formation-tracing of outcrops.

Text Books:

Reference Books:

BCEL423: GROUND WATER MANAGEMENT
(ELECTIVE-I) (3-0-0-3)
Total Hrs:45Hrs

Course-Prerequisites: Geotechnical Engineering- II and Water Resources Engineering I
Co-Requisites: ---

Course Objective:
1. To study well hydraulics and various types of flows
2. To study methods of ground water replenishment
3. To study the methods for ground water recharge

Course Outcome:
Student shall be able to
1. Demonstrate ground water movement using various laws
2. Design infiltration galleries and ground water replenishment
3. Use different methods of ground water recharge

Unit-I [07 Hrs]
Introduction: occurrence of ground water, geological formations as aquifers, types of aquifers

Unit-II [08 Hrs]
Ground water movement, Darcy’s Law, permeability and its measurement, tracing of ground water movement, fundamental equations for steady and unsteady ground water, flow, flow-nets.

Unit-III [08 Hrs]
Well hydraulics; steady flow in confined, semi-confined and unconfined aquifers, radial flow, superpositions; method of images, multiple well system.

Unit-IV [06 Hrs]
Different method of well constructional, construction of well casings and screens natural and artificial gravel packed wells, safe yields, estimation, pumping recuperation tests.

Unit-V [06 Hrs]
Two dimensional flow, method of solution, infiltration galleries, Ground-water replenishment, Recharge of ground water, different methods

Unit-VI [05 Hrs]
Salt water instruction, concept, interface and its location, control of intrusion.

Text Books:

Reference Books:

BCEL425: ENVIRONMENTAL MANAGEMENT (3-0-0-3) (ELECTIVE-I) Total Hrs: 42

Course-Prerequisites: ---
Co-Requisites: ---

Course Objective:
1. To create environmental awareness
2. To understand impact of environmental degradation
3. To understand principle, laws, methods of environmental management

Course Outcome:
Student shall be able to
1. Develop environmental awareness
2. Design, conduct, analyzes civil engineering experiments and interprets the data.
3. Use the knowledge of environmental legislations and environmental acts

Unit I: [08Hrs]
General: - Global and Indian scenario
National environmental policy

Unit II: [06Hrs]
Air Pollution and Control, Climate Change.

Unit III: [08Hrs]
Public Private Participation Model, ISO Certification, EHS, EDM, Environmental organizations for planning and implementation sustainable development Preventive and reactive strategies for environmental pollution control

Unit IV: [08Hrs]
Environmental impact and risk assessment Methodologies: Adhoc, checklist, network, matrix etc. Typical case studies of environmental impact assessment

Unit V: [06Hrs]
Environmental impact statements, Environmental Audit, Environmental management Plan

Unit VI: [06Hrs]
Environmental Legislation, Air, water and Environmental acts.

Text Books:

**Reference Books:**

**OPEN ELECTIVES**
For syllabus of open elective subjects, please refer syllabus provided in B.E. (Electronics Engineering) programme - Sixth Semester

MBL105 General Proficiency —V “Employability Skills & Technical Report Writing”
For syllabus: please refer electronics engg. Departments syllabus in sixth semester

MBL 106 General Proficiency —VI Research Methodology Workshop
For syllabus: please refer electronics engg. Departments syllabus in sixth semester

**SEMESTER VII**

BCEL320: PROJECT PLANNING & MANAGEMENT  (3-1-0-4)
Total Hrs.: 45

**Course-Prerequisites:** ---
**Co-Requisites:** ---

**Course Objectives:**
1. To learn elements of management in civil engineering projects, organization structure and quality control.
2. To study project planning, project monitoring, cost planning, and resource allocation through network techniques.
3. To understand engineering economics and laws related to contracts, labor safety etc.

**Course Outcomes:**
Student shall be able to
1. Manage projects across a broad range of scale, complexity, scope, organizational culture/structure and inherent risks with the help of project management tools and techniques.
2. Apply effectively the principles of scheduling techniques in project, cost and equipment planning.
3. Develop skills to solve the problems of project management, apply the principles of cost-benefit analysis to take appropriate decision and understand the contract management.

Unit I : Elements of Management  [4 Hrs]
Project cycle, Organization, planning, scheduling monitoring updating and management system in construction, Quality Control.

Unit II : Network Techniques  [10 Hrs]
Bar charts, milestone charts, work break down structure and preparation of networks. Application of network Techniques like PERT, GERT, CPM AON and AOA in construction management. Project monitoring, cost planning, resource allocation through network techniques. Line of balance technique

Unit III : Engineering Economics  [9 Hrs]
Time value of money, Present economy studies, Equivalence concept, financing of projects, economic comparison present worth method Equivalent annual cost method, discounted cash flow method, analytical criteria for postponing of investment retirement and replacement of asset. Depreciation and break even cost analysis.

Unit IV : Contract Management  [9 Hrs]
Legal aspects of contraction, laws related to contracts, land acquisition, labor safety and welfare. Different types of contracts, their relative advantages and disadvantages. Elements of tender preparation, process of tendering pre-qualification of contracts, Evaluation of tenders, contract negotiation and award of work, monitoring of contract extra items, settlements of disputes, arbitration and commissioning of project.

Unit V. Equipment Management  [4 Hrs]
Productivity, operational cost, owning and hiring cost and the work motion study. Simulation techniques for resource scheduling.

Unit VI. Industrial Relations  [9 Hrs]

**Text Books:**

**Reference Books:**

BCEL322: ESTIMATING & COSTING  (3-1-0-4)
Total Hrs.: 45

**Course-Prerequisites:** Building Design & Drawing, Surveying-I, Surveying-II
**Co-Requisites:** Estimating & Costing (PR)

**Course Objectives:**
1. To understand the purpose of quantity estimates and methods of cost estimates.
2. To learn quantity estimates of various materials and techniques required for construction.
3. To study about valuation and purpose of valuation.

**Course Outcomes:**

Student shall be able to

1. Use the knowledge of purposes and various methods of estimates.
2. Calculate quantity estimates of various materials.
3. Calculate effectively the valuation of properties of civil engineering aspects.

**Unit I:** [8 Hrs]

General: Importance of the subject, purpose of quantity estimates, Modes of measurement and units of measurements IS1200. Methods of cost estimate in general, various methods of stage-I (approximate) estimates. Specification: Purpose and principles of specification writing, types of specification writing and developing detailed specification of a few items related to building, Irrigation Work, Road work.

**Unit II:** [8 Hrs]

Cost Building up: purpose and principles, importance of Schedule of Rates in cost estimates, factors affecting analysis of rates. Fixed, variable prime and supplementary cost, overhead costs and its allocation. Recommendations from N.B.O. for Task work, No. of workman etc., Schedule of rates, market rate analysis of some specific items including transportation cost.

**Unit III:** [7 Hrs]

Cost & Quantity Estimate: Methods of detailed estimates, forms used, detailed estimates of Civil Engineering works, Building, Quantity estimates: Working out quantities of various materials required for construction, such as cement, steel, bricks, aggregates, timber.

**Unit IV:** [8 Hrs]

Earth work estimates in Roads including hill road. Cost Accounting, Various methods, classification of cost, direct & indirect charges, distribution of overheads, MAS account, issue rate of store accounts.

**Unit V:** [9 Hrs]


**Unit VI:** [5 Hrs]

Organization for construction industry specific to Construction Industry. Organization Site administration.

**Text Books:**


**Reference Books:**


**BCEP322: ESTIMATING & COSTING LAB. (0-0-2-1)**

**List of Practical:**

1. Specification for TEN items (Building works –6 items, road work –2 items, irrigation work –2 items).
2. Detailed estimate of a building, single storied with minimum four rooms with flat roof load bearing type structure
3. Detailed estimate of a building, single storied with minimum four rooms with flat roof frame type structure
4. Detailed bar bending schedule of components of building in experiment No. 3
5. Detailed estimate of road of minimum 1 km length with hot mix coat.
6. Detailed estimate of any two of the following: a) Septic tank for a colony b) R.C.C framed structure residential building c) Culvert
7. Analysis of Rates for Eight items.
8. Problem of valuation of existing residential building.
9. Tender documents for the Experiment No. 2
10. Submission of detailed estimate of building using Qe-Pro software.

**BCEL426: REHABILITATION OF STRUCTURES** (3-0-0-3)

**Total Hrs:** 42

**Course Prerequisites:** Concrete Technology

**Course Requisites:** ---

**Course Objective:**

1. To understand the quality of concrete, durability aspects, causes of deterioration.
2. Assessment of distressed structures, repairing of structures and demolition procedures.

**Course Outcomes:**

students will be able to:

1. Understand the quality of concrete, durability aspects, causes of deterioration.
2. Assessment of distressed structures, repairing of structures and demolition procedures.

**UNIT-I** [7 Hrs]
REPAIR STRATEGIES AND MAINTENANCE
Importance of Maintenance various aspects of Inspection. Assessment procedure for evaluating a damaged structure, causes of deterioration. Corrective & preventive maintenance of foundation as sub-structures.

UNIT-II [7 Hrs]

SERVICEABILITY OF CONCRETE
Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete – Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion – Effects of cover thickness.

UNIT-III [7 Hrs]

REPAIR BY DIFFERENT MATERIALS
Special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

UNIT-IV [7 Hrs]

TECHNIQUES FOR REPAIR
Rust eliminators and polymers coating for rebar during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection.

UNIT-V [7 Hrs]

REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES
Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

UNIT VI [7 Hrs]

DEMOLITION AND DISMANTLING TECHNIQUES
Non Engineering Demolition, Mechanical Method of demolition, Dismantling of building and reuse of material and fittings. - case studies.

Text Books:

Reference Books:

BECL 402: ARTIFICIAL NEURAL NETWORK & FUZZY LOGIC
Elective – II Total Hrs.: 45

Course Prerequisites: ----
Co Prerequisites: ----
Course Objectives:
1. To cater the knowledge of Neural Networks and Fuzzy Logic Control
2. To provide comprehensive knowledge of adaptive fuzzy logic and design of the fuzzy control using genetic algorithm

Course Outcomes:
Student shall be able to
1. Apply knowledge of neural networks and fuzzy logic control for civil engineering
2. Design fuzzy control using genetic algorithm

Unit-I: Fuzzy Set Theory [07 Hrs]
Basic Definition and terminology, Basic Concepts of Fuzzy Logic, Set Theoretic Operators, Membership functions-formulation and parameterization, Fuzzy Union, Intersection, and Complement, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems- Mamdani and Sugeno Fuzzy models, Fuzzy Associative Memories

Unit-II: Fuzzy Arithmetic & Fuzzy Relations [07 Hrs]
Fuzzy numbers, Arithmetic operations, Projections and Cylindric Extensions, Binary fuzzy relations, Binary fuzzy relations on a single set, Fuzzy Equivalence relations, Fuzzy Ordering relations

Unit-III: [6 Hrs]
Features of Membership function, Fuzzification, Defuzzification methods, Extension principle

Unit-IV: Fuzzy Rule-Based Systems [08 Hrs]
Canonical rule forms, Decomposition of compound rules, Likelihood and Truth Qualification, Aggregation of fuzzy rules, Graphical Techniques of Inference, Fuzzy Decision Making

Unit-V: Applications [08 Hrs]
Fuzzy pattern recognition, feature analysis, partitioning of feature space, single sample identification multi feature pattern recognition, simple fuzzy logic controller: control system design stages, assumptions in a fuzzy control system design, general fuzzy logic controllers, simple examples.

Unit-VI: Neuro-Fuzzy Controller In Engineering Applications [09Hrs]

Text Books
1. Fuzzy Sets and Fuzzy Logic theory and applications, George J.Klir & Bo Yuan
BCEL428: Advanced Concrete Design (ELECTIVE-II)  
(3-1-0-4)  
Total Hrs: 42  
Course-Prerequisites: Structural Design – I  
Co-Requisites: ---  
Course Objectives:  
1. To understand the philosophies of design of reinforced cement concrete and to justify this is the best  
2. To know design of advanced structural elements with safety, stability and economical way  
3. To study of provisions in IS 1893 and IS 456 for design of structures  
Course Outcomes:  
Student shall be able to  
1. Design reinforced concrete structure like bridge, portal frame, overhead circular water tanks, cylindrical shells etc.  
2. Apply Earthquake relevant Guidelines during construction materials, processes and systems used in the real world  
UNIT-I  
[10 Hrs]  
Design of overhead circular service reservoirs. Analysis of staging by cantilever method. Analysis and design for earthquake as per relevant IS codes.  
UNIT-II  
[10 Hrs]  
Design of highway bridge with IRC loading and equivalent UDL. Slab type, Two/Three girder type  
UNIT-III  
[10 Hrs]  
Design of building frames up to two bay/two storey, including design of foundation. Using Limit state Method.  
UNIT-IV  
[6 Hrs]  
Design of cylindrical shells by beam theory, advantages, assumptions, ranges of validity and beam analysis. Design of shells with or without edge beam.  
UNIT-V  
[6 Hrs]  
Design of Silos. (Using Limit state Method)  
Text Books:  
Reference Books:  

BCEL427: MATRIX METHOD OF STRUCTURAL ANALYSIS (ELECTIVE-II)  
(3-1-0-4)  
Total Hrs.:45  
Course-Prerequisites: Structural Analysis- II  
Co-Requisites: ---  
Course Objectives:  
1. To introduce stiffness method for analysis of statically indeterminate structures.  
2. To develop a computer program for structural analysis based on the matrix stiffness method  
3. To understand the basics of finite element method and application to structural analysis  
Course Outcomes:  
Student shall be able to  
1. Understand the matrix stiffness method and be able to develop a computer program based on the matrix stiffness method for analysis of two-dimensional plane structures  
2. Understand the basics of finite element method and application to structural analysis  
3. Analyze complex structures using computer software  
Unit-I  
[9 Hrs]  
Unit-II  
[7 Hrs]  
Formulation of elemental / local stiffness matrix and global stiffness matrix for Beam members (without axial deformation) for continuous beams, Transformation matrix Assembly of global/Structure stiffness matrix, Member load matrix due to concentrated load, Uniformly distributed load, Moment assembly of global/ structure load matrix up to (8X8) Solution to problem with maximum degree of freedom four.  
Unit-III  
[7 Hrs]  
Formulation of elemental /local stiffness matrix and global stiffness matrix for Plane Frame member (With axial deformation), Transformation matrix, Assembly of global / Structure stiffness matrix, Member load matrix due to concentrated loads, Uniformly distributed loads, moments, Assembly of Global /Structure load matrix. Solution to plane frame problems with maximum degree of freedom six, Inclined member problem.  
Unit –IV  
[7 Hrs]  
Formulation of element / local stiffness matrix and global stiffness matrix and global stiffness matrix for
plane Grid transformation Matrix, Assembly of global/structure stiffness matrix, Member load matrix due to concentrated loads, uniformly distributed Loads, moments, Assembly of global/structure load matrix. Solution to problem with maximum degree of freedom six.

**Unit – V** [7 Hrs]
Analysis of Member for temperature loading, initial joint displacement (sinking of support), lack of fit in trusses, trusses with inclined roller, storing of global/structure stiffness Matrix, full storage, banded storage, band Minimization.

**Unit – VI** [7 Hrs]
Introduction to finite Element method, basic concept, discretization of structure, Rayleigh Ritz member for bar elements (prismatic/Non prismatic) Displacement based Bar elements (prismatic / non-prismatic) and Bean elements (prismatic) Displacement based bar elements (prismatic/Non-prismatic) and Bean element (prismatic), Load, Matrix for body forces.

**Text Books:**

**Reference Books:**

**BCEL429: PAVEMENT DESIGN (ELECTIVE-II)** (3-1-0-4) Total Hrs.:45

**Course-Prerequisites:** Basic Transportation Engineering
**Co-Requisites:** ---
**Course Objectives:**
1. To make the students fully conversant with the latest methods of analysis and design of flexible and rigid pavements along with their strengthening techniques.
2. To study importance and functions of various component of pavements,
3. To study stresses developing in flexible pavements

**Course Outcomes:**

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Student shall be able to
1. Analyze & design pavements i.e. flexible & rigid, conduct tests & experiments and interpret the data.
2. Design various components of flexible & rigid by IRC methods to meet desired needs within realistic constraints.

**Unit – I** [7 Hrs]
**GENERAL:**

**DESIGN PARAMETERS:**
Standard Axile load and wheel assemblies for road vehicles. Under carriage system for aircraft, Type & contact pressure, contact area imprints, Computations of ESWL for flexible and rigid pavements. Load repetition and distribution of traffic for highway and airfield pavement, airport traffic areas.

**Unit – II** [7 Hrs]
**MATERIALS CHARACTERISTICS:** AASHO

**ANALYSIS OF FLEXIBLE AND RIGID PAVEMENTS:**
Stress, Strain deflection analysis for single, two three and multi layered flexible pavement systems. Stress and deflections for rigid pavements due to load and temperature, influence Charts, unlimited load analysis joints.

**Unit – III** [8 Hrs]
**HIGHWAY PAVEMENT DESIGN:**
Flexible: North Dakota cone, Group index, CBR, IRC – 37, Brumister, Triaxial (Kansas), AASHO methods of design.

**Unit – IV** [8 Hrs]
**AIR FIELD PAVEMENT DESIGN :**
Flexible: U.S. Corps of Engineering, CBR, FAA, Mcload(Canadian)
Rigid PCA, FAA & LCN, ultimate load Analysis yield lines patterns, methods.

**Unit – V** [7 Hrs]
**PAVEMENT TESTING AND EVALUATION :** Field Density, CBR, Plate load Test, Condition surveys and surface evaluation for unevenness, rut depth, profilometers, Bump integrators, Benkalman Beam Deflection study.

**Unit – VI** [8 Hrs]
**STRENGTHENING OF PAVEMENTS:**
Design of flexible, composite and rigid overlays for flexible and rigid pavements, Repairs, Maintenance
and rehabilitation of pavements.

**SPECIFICATION AND COST ESTIMATES:**


Pavement Systems Management: Systems management, case studies of Highway and Airfield pavement projects.

**Text Books:**

**Reference Books:**

**BCEL441: ADVANCED HYDRAULICS (ELECTIVE-II)**
(3-1-0-4) Total Hrs: 45

**Course-Prerequisites:** Fluid Mechanics – II

**Co-Prerequisites:** ---

**Course Objectives:**
1. To understand the flow pattern in the open channels.
2. To understand the criteria for formation of hydraulic jump.
3. Study different types of GVF profiles and apply various methods to determine the length of GVF profiles.

**Course Outcomes:**

Student shall be able to
1. Solve the problems related to determine length of GVF profile using various methods.
2. Understand the difference between GVF & RVF and able to apply various equations to determine parameters involved in formation of hydraulic jump.
3. Study the causes of water hammer and understand the difference between rigid water column theory and elastic water column theory.

**Unit-I** [8 Hrs]

2) Theory of gradually varied flow. Analysis of surface profile of gradually varied flow.

**Unit-II** [8 Hrs]

**Unit-III** [8 Hrs]
4) Theory of Hydraulic jump, Location of hydraulic jump, application of hydraulic jump in design of hydraulic jump type stilling basin with horizontal apron.

**Unit-IV** [8 Hrs]

**Unit-V** [8 Hrs]
6) Equation describing water hammer phenomena when compressibility of fluid and elasticity of pipe is considered, computation of water hammer pressure of frictionless flow in horizontal pipe for sudden and slow closer of valve, Application of allieví’s method and charts approximate pressure. Water hammer pressures in pumping systems. Method characteristics.

7) Computation of water hammer pressures in oranconed pipe system and surge tank system. Various devices. Used for protection from water hammer pressures.

**Unit-VI** [5 Hrs]
8) Function of surge tank and different type of surge tanks. Equation governing the flow in the simple surge tank system. Analysis of flow in a simple surge tank system. Computation of maximum surges in surge tank system.

**Text Books:**

**Reference Books:**

**BCEL431: SOIL DYNAMICS (ELECTIVE-II)**
(3-1-0-4) Total Hrs: 45

**Course-Prerequisites:** Geotechnical Engineering- II

**Co-Prerequisites:** ---

**Course Objectives:**

1. Understand the concept of behavior of soil under the dynamic loading
2. To study soil settlement characteristics under
3. To study and understand strength and deformation of characteristics of soil.

Course Outcomes:
Student shall be able to
1. Access the soil settlement due to dynamic loading
2. Apply the knowledge of subject for design of machine

Unit I [6 Hrs]
Elastic properties of soil, applicability of Hook’s Law to soil, elastic contents of soil and their determination, Coefficient of elastic uniform compression and shear, cyclic plate load test

Unit II [10 Hrs]
Theory of vibration, degree of freedom, theory of free and forced vibration, natural frequency, resonance, effect of soil inertia on the forced vertical vibration of foundation, method/approaches of determining dynamic characteristics of soil foundation system, empirical methods, Pawn method, Balkrishna Nagraj Approach, Richard’s elastic half space approach.

Unit III [6 Hrs]
Strength and deformation characteristics of soil under dynamic loads, liquefaction are soil, criteria of liquefaction, field and laboratory assessment of liquefaction.

Unit IV [6 Hrs]
Residual soil settlement under dynamic loads, damping properties of soil, effects of vibration on internal friction, cohesion, viscosity, porosity and permeability, vibroviscous soil resistance.

Unit V [10 Hrs]
Earthquake soil settlement under dynamic loads, damping property of soil, effects of vibration on internal friction, cohesion, viscosity, porosity, & permeability; vibroviscous soil resistance. Propagation of elastics waves in isotropic materials, application to dynamic problems, and energy transmission from machine foundation in elastic half space.

Unit VI [7 Hrs]

Text Books:

Reference Books:

BCEL432: GREEN BUILDING (ELECTIVE II)
(3-1-0-4) Total Hrs.: 45

Course-Prerequisites: Building Const & Materials/ Environmental Engineering - II
Co-Requisites: ---

Course Objectives:
1. To understand the concept of high performance green buildings and sustainability
2. To study the various existing rating systems for sustainable building design
3. To study various methods of energy and water conservations

Course Outcomes:
Student shall be able to
1. Use various green construction materials, processes and systems
2. Use knowledge of local, national and international rating systems while designing green buildings
3. Use various methods of energy and water conservation for development of sustainable building

Unit – I [9 Hrs]

Unit – II [8 Hrs]
The green building process and assessment Phases of sustainable development: site planning and evaluation, construction, commissioning, and occupancy phases; site selection and location of building on a site; building design: orientation, components, systems, integrated design, scale; material selection, historic, present, properties, how they work, efficiency; construction: phasing, sequencing, minimization of erosion; occupancy – proper use; reuse; building lifecycle Ecological design

Unit III [5 Hrs]
Introduction and description of existing rating systems for sustainable building design and construction (both new construction and renovations) at local, national, and international level; BEEC, LEED, CHPS, ASHRAE Green Guide, Energy Star Homes, international: BREEAM, BEPAC, Green Star Certification, CASBEE, World Green Building Council.
Unit IV [8 Hrs]
Energy Considerations in Green Building. Buildings' contribution in environment devastation – why the way we build is so critical for sustainable development; electricity consumption per capita in houses. Creating a low energy profile

Unit V [6 Hrs]
Building systems: lighting – day lighting; ventilation – natural ventilation; indoor air quality; heating/cooling – geothermal; passive and active systems for energy production and conservation; water conservation – grey water reuse, water saving plumbing fixtures. Sustainable features in buildings – case studies of interesting items related to topic.

Unit VI [9 Hrs]
Construction Operations and Building Commissioning. Economic issues and future directions in green building. Proper way to promote sustainability, western world as a role model; how to stop it, motivation for conservation, marketing, tax incentives, corporate and government Environmental responsibilities

Text Books:

Reference Books:
3. Hard book on functional Requirements of Buildings (SP41)

Unit I [09 Hrs]
Objective and scope of traffic engineering, intelligent transport, tunnel, and airport engineering. Traffic Engineering: 3E’s of traffic characteristics, road vehicle characteristics, Traffic on Indian roads. Traffic surveys: Speed, Journey time and delay studies, methods of measurement of spot speed headways gaps volume/ capacity surveys speed, volume density interrelations, measurements of running and journey speeds Origin Destination surveys necessity, surveys necessity, survey methods sample size, data analysis & Presentation, Highway capacity, level of service concepts. Traffic Flow measurement and automatic incident detection using video camera. Collision avoidance system.

Unit II [9 Hrs]
Traffic Events:
Statistical method for interpretation regression application of Binomial, Normal Poisson distributions, Discrete and continuous distribution to traffic flow, Test of significance – Chisquare & 'T' test.

Traffic Safety:
Driver error, vehicle & road surface Laws and enforcement traffic accident conditions in India Collection and interpretation of accident data and recording in Std. from skidding speed and weather effects on accidents, Analysis of accidents. Pedestration cyclist & auto vehicle driver’s safety. Traffic regulation 3R and 5E’s of traffic management. Traffic signal control system. Dynamic traffic light signals.

Unit III: [8 Hrs]
Motor Vehicle act and Rules, Education, need and Methods, Air pollution & Noise Pollution by traffic.

Urban Traffic:
Urban transportation problems and Analysis of characteristics of mixed traffic flow, head and administrative set up of traffic cells at various levels, co-ordination with other transport modes, traffic organization. General principles of urban transport planning in context to India cities (Specially
metropolitan). Parking guidance and information system, bridge deciding system. Electronic toll system.

Unit – IV: Airport: [7 Hrs]
Runway And taxiway design: Windrose, cross wind component, Runway Orientation and configuration. Basic runway length and corrections, runway geometric design standards. Taxiway layout and geometric design standards. Exit Taxiway.

Unit – V [6 Hrs]
Airport layout, Airport classification. Terminal Area, Aircraft parking and parking system. Unit Terminal concept, Aprons, Hangers, International Airport layouts, phase development, helipads and heliports.
Visual Aids: Airport marking and Lighting for runway, Taxiway and other areas.
Air traffic control: Need, Network, control aids, Instrumental landing systems, Advances in Air-traffic control.

Unit – VI: Tunneling [6 Hrs]
1. Tunnel alignment Tunnel Surveys, Cross section of Highway & Railway.
2. Tunneling methods in Hard rock and Soft Grounds, Tunnel lining.
4. Advances in Tunneling, Tunnel boring Mechanics, Case studies.

Text Books:

Reference Books:

BCEL 434 : Municipal and Industrial Water Treatment
(ELECTIVE-III) Total Hrs.: 45

Course-Prerequisites: Environmental Engineering - I
Co-Requisites: ---

Course Objectives:
1. To understand the basic concept and requirement of treatment for municipal and industrial water.
2. To study theory and design of various filters
3. To study various theories and methods of adsorption

Course Outcomes:
Student shall be able to
1. Use concept and requirement of treatment for municipal and industrial water
2. Design back washing, slow sand and rapid sand filter
3. Apply knowledge of adsorption for taste, odour and color removal

Unit I [5 Hrs]
Water quality criteria and standards, requirements of water treatment facilities – unit operations and unit processes – important physical properties of water.

Unit II [10 Hrs]
Theories of chemical coagulation, common coagulant in water. Factors affecting coagulation, determination of coagulant doses, perikinetik and orthokinetic coagulation, theory and use of coagulant aids, design, construction. and operation of flocculators, design of clariflocculator.

Unit III [10 Hrs]

Unit IV [4 Hrs]
Factors affecting disinfect ion – free and combined available chlorine, ultraviolet irradiation, ozonation disinfection of new mains – emergency chlorination. Water treatment for swimming pools

Unit V [8 Hrs]

Unit VI [8 Hrs]
Softening by ion exchange. Natural and synthetic media, capacity, regeneration. Ion exchange demineralization. Miscellaneous method of water treatment, iron and removal, desalination, nitrate, phosphate and arsenic removal and recent advances.

Text Books:

Reference Books:


**BCEL435: REMOTE SENSING &GIS (Elective-Ill) (3-1-0-4)**

**Total Hrs.: 45**

**Course Outcomes:**

1. To study the basic concepts and uses of GIS and remote sensing
2. To study working of various elements of remote sensing
3. To use GIS to create and depict digital representation of the earth's surface.

**Course Objectives:**

1. Understands basic concept and uses of Remote Sensing
2. Understands different elements of remote sensing
3. Carry out mapping and digital elevation modeling or digital terrain mapping

**Unit-I**

REMOTE SENSING


**Unit-II**

EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS

Atmospheric characteristics, Scattering of EMR, Raleigh, Mie, Non-selective and Raman Scattering, EMR Interaction with Water vapour and ozone, Atmospheric Windows, Significance of Atmospheric windows, EMR interaction with Earth Surface Materials, Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy, Reflectance, Specular and Diffuse Reflection Surfaces, Spectral Signature, Spectral Signature curves, EMR interaction with water, soil and Earth Surface: Imaging spectrometry and spectral characteristics

**Unit-III**

OPTICAL AND MICROWAVE REMOTE SENSING

Satellites Classification Based on Orbits and Purpose, Satellite Sensors, Resolution, Description of Multi Spectral Scanning, Along and Across Track Scanners, Description of Sensors in Landsat, SPOT, IRS series, Current Satellites, Radar, Speckle, Back Scattering, Side Looking Airborne Radar, Synthetic Aperture Radar, Radiometer, Geometrical characteristics; Sonar remote sensing systems

**Unit-IV**

**GEOGRAPHIC INFORMATION SYSTEM**

GIS – Components of GIS, Hardware, Software and Organisational Context, Data, Spatial and Non-Spatial, Maps, Types of Maps, Projection, Types of Projection, Data Input, Digitizer, Scanner, Editing, Raster and Vector data structures, Comparison of Raster and Vector data structure, Analysis using Raster and Vector data, Retrieval, Reclassification, Overlaying, Buffering, Data Output, Printers and Plotters

**Unit-V**

**MISCELLANEOUS TOPICS**


**Unit VI**


**Text Books:**


**Reference Books:**


**BCEL 436: ADVANCED STEEL DESIGN (Elective-Ill) (3-1-0-4)**

**Total Hrs.: 45**

**Course Outcomes:**

1. Understanding the concepts of analysis and design of advanced steel structures like bridges, storage vessels and towers

**Course Objectives:**

1. Understand design of different types of bridges and storage vessels
2. Analyze different special structures related to field of steel design

**Unit-I**

Gantry Girders

Cranes- Hand operated, Electrically operated overhead, Design considerations, Crane girder and Gantry girder design.

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1. Up to two bay single storied, foundations, connections, detailing of steel connections.
2. North light trusses and lattice girders for industrial buildings.

Unit – III : Bridges [10 Hrs]
Types of bridges, Foot Bridge, Road Bridge, Railway Bridge. Rolled beam bridges, Plate girder bridges, trussed bridge, through type, deck type bridges. Weight of bridge truss by empirical formulae. Loading on foot ways, IRC loading, loading on railway bridges. Design of foot bridge, Design of components of railway and road bridges , Bearings , Types of bearings, bearing pads, design of rocker and roller bearings.

Unit – IV : Storage Vessels: [5 Hrs]
General concepts, design of bunkers,Circular and rectangular, including oil tanks.

Unit – V : Open Web Sections [5 Hrs]
Introduction, design of web sections.

Unit – VI : Composite construction. General Concepts. [5 Hrs]
Properties, Steel-Concrete composite design of encased beams, columns, shear connectors.

Text Books:

Reference Books:

BCEL437 : EARTH & EARTH RETAINING STRUCTURE (Elective-III) (3-1-0-4)
Course-Prerequisites: Geotechnical Engineering- II
Co-Requisites: ---

Course Objectives:
1. To introduce slope stability analysis, foundation design and retaining wall design.
2. To study the soil properties required for different types of earth retaining structures

Course Outcomes:
Student shall be able to
1. Use slope stability analysis for foundation and retaining wall design
2. Describe stress distributions beneath shallow foundations and estimate settlements

Unit – I : EARTH PRESSURE ON RETAINING WALLS : [08 Hrs]
Rankines & Coloumb’s earth pressure theories Poncelets and Culman’s graphical construction for active and passive pressures. Effects of wall movement, Wall friction, type of slip surface. Wall angle, backfill slope angle, surcharges & line loads on lateral earth pressure. Direction & point of earth force application.

UNIT-II : STABILITY OF EARTH RETAINING STRUCTURES:
Types of Walls: gravity, cantilever walls, walls with counterforts and relief shelves, their typical dimensional details. Stability requirements for overtaking, sliding, bearing capacity failure, overall stability against shear failure in backfill & foundation soil, application of geosynthetics in earth retaining structures [08]

Unit – III : SHEET PILE RETAINING STRUCTURES:
Sheet piles walls bulk heads. Types of sheet piles, constructional features cantilever & anchored walls, their suitability. Analysis for design of cantilever walls in cohesion less and cohesive soils, approximate analysis, Analysis for anchord sheet pile with free end & fixed end support condition. Blum’s criteria. Deadman and anchors: location and design principles [08]

Unit – IV : COMPSCTED EMBANKMENTS: [08 ]
Compaction control in field compaction, consideration of placement moisture content during field compaction, over compaction, effects of compactive effect on compaction of clayey and sandy soil, effects of lifts in deep compaction, correction for excluded grain sizes in laboratory compaction Tests Theories of compaction: water film and lubrication concept, microstructure concept.

Unit – V : STABILITY OF SLOPES: Friction circle methods, factors of safety, stability numbers and use of stability charts, base failure, stability of earth dam slopes, for steady seepage and sudden draw down approximate analysis for plain slip surface, bishop’s method for slope stability. [08]

Unit – VI : COFFERDAMS: Types, suitability, stability analysis of cellular and diaphragm type cofferdams, TVA method, interlocked stresses [05]

Text Books:

Reference Books:

BCEL438 : COMPUTATIONAL FLUID DYNAMICS (Elective-III) (3-1-0-4)
Total Hrs.: 45
Course-Prerequisites: Fluid Mechanics – II
Co-Requisites: ---

Course Objectives:
1. To understand the various mathematical models to fluid dynamics problems
2. To develop formulating of flow problems using mathematical equation and to understand formulation of 2 D and 3D problems

Course Outcomes:

Student shall be able to

1. Understand finite difference method, finite volume method, and FEF method and governing equations applicable for flow analysis
2. Formulate incompressible viscous flow by various methods and study various mathematical like Euler's equation, Navier-stokes equation to various problems
3. Apply knowledge of computational methods to find out solutions of numerous problems of fluid dynamics

Unit I


Unit II


Unit III


Unit IV

Formulations of incompressible viscous flows: Formulations of incompressible viscous flows by finite difference methods, pressure correction methods, vortex methods. Treatment of compressible flows: potential equation, Euler equations, Navier-stokes system of equations, flowfield-dependent variation methods, boundary conditions, example problems.

Unit V

Finite volume method: Finite volume method via finite difference method, formulations for two and three-dimensional problems.

Unit VI

Standard variational methods - 1: Linear fluid flow problems, steady state problems,

Standard variation methods – 2: Transient problems.

Text Books:


Reference Books:


SEMESTER -EIGHTH

BCEP439: Field Project (0-0-16-16)

Course-Prerequisites: 141 Credits & Internship

Co-Requisites: ---

Project Topics:

1) Construction in residential area.(Townships)
2) Transportation Engg. (Construction of Road, Railway, Bridges, Airfield Pavements)
3) Construction in Commercial buildings.
4) Irrigation Engg. (Culverts , Embankment , Dam, Spillways, Weirs and cannons
5) Environmental Engg area.(Water, waste water, Air, Solid Waste, Noise Pollution)
6) Water shade management or rain water Harvesting.
7) Inter disciplinary area.(Intelligent Transportation, Geo Environment, GIS/GPS, Geo Textile)

Guidelines for the students:

1. A group of students (maximum four) shall select project topic from the above list of Project topics and has to present a Power point presentation.
2. Student will submit the detailed report starting from foundation of project, Building plan, working plan, Structural Analysis, Structural Design, complete Budget, Cost of project, actual cost of the work and supervision for a period of three month on ongoing construction and submit audio visual recording date wise.
3. At the end of every two months progress seminar will be conducted in presence of industrial expert. In first progress seminar student shall submit foundation details and working drawing, structural analysis element/ item wise, estimated cost for ongoing projects.
4. Second progress seminar will be conducted after Four months where student shall submit complete audio visual details of first stage (two month supervision) ongoing of project.
5. At the end of six month student shall submit the complete details in the form of draft thesis with audio visual details and the forms of certificate from the project Engineers through guide and student shall appear for pre submission seminar where in if it is observed that student has not understood the concept, extension may be given for one/two months.

Final Thesis shall be submitted as per the institute guideline issued time to time.

BCEL 440 : SELF STUDY* (2-0-0- 2)

Course-Prerequisites: 141 Credits & Internship

Co-Requisites: ---
Course Objectives:
- To identify smart materials and techniques used in civil engineering
- To identify the different failures and causes of failures in civil engineering structures
- To study advanced techniques in disaster management and eco-friendly buildings

Course Outcomes:
Student shall be able to
1. Use various smart materials and advanced techniques in construction of structures
2. Identify causes of failure and suggest remedial techniques
3. Prepare mapping of disaster management

Content:
1. Study of various smart material used in Civil Engineering.
4. Advance Techniques in Construction Process
5. Advance Water & Waste water technology.
6. Disaster Management.

References Recommended:
1. CDEEP Remote Centre, GHRCE, Nagpur
2. Various Journals
3. Text Books and Articles in related topic
4. Internet Wikipedia and other relevant websites.

NOTE:- The student shall prepare a detailed report of the above work and submit to the respective Teacher’s for evaluation.

BCEP 323 Computer Aided Design (0-0-2-1)
Course-Prerequisites: 141 Credits & Internship
Co-Requisites: ---

Course Objectives:
1. To understand the basics of design with the help of computer aided design software’s
2. To prepare complete working drawing as well as structural drawing of different civil engineering structure

Course Outcomes:
Student shall be able to
1. Analyze & design civil engineering structures using software’s
2. Prepare the detailed working & structural drawing for civil engineering structures

References:
7. Handbook of seismic analysis and design of structure, Farzad Neam
8. www.nicee.org

Term Work
1) Analysis of multistoried frames by Equivalent Static Analysis Method using IS 1893:2002
2) Seismic Analysis & Design of multistoried building using softwares SAP2000 / STAAD Pro and check by any of analytical methods including Equivalent Static Analysis Method.
3) Seismic Analysis & Design of Elevated Service Reservoir using SAP2000 / STAAD Pro. and check by any of analytical methods

NOTE:- The student shall prepare a submission of the above work in Hard and Soft copy and submit to the respective Teacher’s for evaluation.
DEPARTMENT OF INFORMATION TECHNOLOGY  
SCHEME OF B.E. (INFORMATION TECHNOLOGY)  
*TAE will be based on Home Assignment, Seminar, Quiz, Surprise Test, Group Discussion, Debate, General Behavior,  
Attentiveness and Attendance

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**SEMESTER-V**

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ELECTIVE - I
BCSL410 - SOFT COMPUTING
BITL307 - SCRIPTING LANGUAGES
BITL308 - MANAGEMENT INFORMATION SYSTEMS
BITL309 - CYBER LAWS
BCSL312 - COMPUTER GRAPHICS AND VISUALISATION

SEMMESTER-VI

| Heads | TOTAL | 20 2 4 26 22 120 120 360 50 -- 650 |

TOTAL: 650
### Research Methodology Workshop

| Heads | TOTAL | 23 | 1 | 6 | 30 | 23 | 120 | 120 | 360 | 100 | 50 | 750 |

### ELECTIVE – II

- **BECL409** - DIGITAL IMAGE PROCESSING
- **BITL403** - MULTIMEDIA SYSTEMS
- **BCSL414** - DATA MINING AND WAREHOUSING
- **BCSL403** - AI AND EXPERT SYSTEM
- **BCSL311** - E-COMMERCE

### OPEN ELECTIVES:

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<th>Code</th>
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<td>3</td>
<td>BECL417</td>
<td>Sensors &amp; Transducers</td>
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<td>BHUL414</td>
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<td>6</td>
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<td>Constitution of India</td>
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<td>7</td>
<td>BMEL401</td>
<td>Nanotechnology</td>
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### SEMESTER-VII

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**ELECTIVE – III**
- BCPL405 - NATURAL LANGUAGE PROCESSING
- BITL407 - ADVANCED WEB TECHNOLOGIES
- BITL408 - DISTRIBUTED DATA BASES AND OBJECT ORIENTED DATA BASES
- BECL413 - WIRELESS COMMUNICATION
- BMEL509 - INDUSTRIAL ROBOTICS

**ELECTIVE- IV**
- BECL423 - PATTERN RECOGNITION
- BITL409 - BIO-INFORMATICS
- BITL410 - SOFTWARE TESTING
- BITL411 - ENTERPRISE RESOURCE PLANNING
- BCPL411 - ADVANCED OPERATING SYSTEM DESIGN.
DEPARTMENT OF INFORMATION TECHNOLOGY
THIRD SEMESTER

BCSL201: DATA STRUCTURES USING C  [3-1-2-6]  Total Hrs: 45

Pre-requisite: Basic of Computing
Co-requisite: NA

Course Objectives:
1. This course introduces basic idea of data structure while making aware of methods and structure used to organize large amount of data.
2. It also aimed at developing skills to implement methods to solve specific problems using basic data structures.
3. The course also provides career opportunities in design of data, implementation of data, technique to sort and searching the data.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand the Basics concept of data structure.
2. Identify the structure and implementation of structures handling large amount of data.
3. Develop an appropriate structure for data structure problems and analyze them for certain applications.
4. Understand advanced techniques for sorting and searching data efficiently.

Course Syllabus
UNIT I: Arrays, Records And Pointers  (7 Hrs)
Introduction, Linear Arrays, Arrays as ADT, Representation of Linear in Memory, Traversing Linear Arrays, Inserting and deleting, Sorting; Bubble Sort, Searching; Linear Search, Binary Search, Multidimensional Arrays, Representation of Polynomials Using Arrays, Pointers; Pointer Arrays, Dynamic Memory Management, Records; Record Structures, Representation of Records in Memory; Parallel Arrays, Matrices, Sparse Matrices

UNIT II: Linked List  (9 Hrs)
Introduction, Linked Lists, Representation of Linked Lists in Memory, Traversing a Linked List, Searching a Linked List, Memory Allocation; Garbage Collection, Insertion into a Linked List, Deletion from a Linked List, Header Linked List, Circularly Linked Lists, Two-Way Lists (or Doubly Linked Lists), Josephus Problem and its Solution, Buddy Systems

UNIT III: Stacks, Queue and Recursion  (9 Hrs)
Introduction, Stacks, Array Representation of Stacks, Linked Representation of Stacks Stack as ADT, Arithmetic Expression, Polish Notation, Application of Stacks Recursive, Towers of Hanoi, Implementation of Recursive Procedures by Stacks, Queue, Linked Representation of Queues, Queues as ADT, Circular of Queues Deques, Priority Queues, Applications of Queues

UNIT IV: Trees  (10 Hrs)

UNIT V: Graphs and their Applications  (6 Hrs)
Introduction, Graph Theory Terminology, Sequential Representation of Graphs; Adjacency Matrix; Path Matrix, Warshall’s Algorithm; Shortest Paths, Linked Representation of a Graph, Operations on Graphs, Traversing a Graph, Posets; Topological Sorting, Spanning Trees

UNIT VI: Sorting and Searching  (4 Hrs)
Introduction, Sorting, Insertion Sort, Selection Sort, Merge-Sort, Shell Sort, Radix Sort, Searching and Data Modification, Hashing, Advanced topic on Data Structure

Text Books:
a. Data Structures with C, Seymour Lipschutz, Schaums Outlines, Tata Mc Graw Hill

Reference Books:
1. S. Sahani, Data Structures in C,
2. D.Samantha, Classic Data Structure, PHI Publications

BCSP201: DATA STRUCTURES USING C
Evaluation Scheme: Practical [2P]
Total Hrs: 30

List of Practical:
1. Write and execute a program in C to implement stack using arrays
2. Write and execute a program in C to implement queue using arrays
3. Write and execute a program in C to implement simple linked list
4. Write and execute a program in C to implement stack using linked list
5. Write and execute a program in C to implement queue using linked list
6. Write and execute a program in C to implement doubly linked list
7. Write and execute a program in C to implement circular linked list.
8. Write and execute a program in C to reverse a singly and doubly linked list
9. Write and execute a program in C to insert a node in a linked list in a sorted fashion
10. Write and execute a program in C to implement binary tree, finding the depth of a tree
11. Write and execute a program in C to implement inorder, preorder and postorder traversals
12. Write and execute a program in C to find if two trees are identical
13. Represent a polynomial as a linked list and write functions for polynomial addition
14. Implement a stack and use it to convert infix expression to postfix.
15. Write and execute a program in C to implement bubble sort and selection sort using menu driven program
16. Write and execute a program in C to implement merge sort.
17. Implement hashing with open addressing.

BCSL202 COMPUTER ARCHITECTURE & ORGANIZATION (4-0-0-4) Total Hrs: 45

Pre-requisite: Basics of Electronics
Co-requisite: NA

Course Objectives:
1. This course introduces basic fundamental Units of a computer system and its operation and flow of information between these Units.
2. It is aimed at developing skills to implement control Unit performing operations such as Addition, Subtraction, Multiplication and Division
3. The course provides career opportunities in the subject areas of designing an advanced computer system.

Course Outcomes:
1. Upon successful completion of the course, students will be able to
2. Understand the basic structure and operation of a digital computer.
3. Understand Arithmetic operations of fixed and floating point addition, subtraction, multiplication and Division.
4. Understand different types of control and concept of pipelining.
5. Understand organization and design of memory. Concept, structure and operation of Cache memory and virtual memory
6. Identify different ways of communicating with I/O devices and interfaces.

Course Syllabus
Unit I: BASIC STRUCTURE OF COMPUTERS
Functional units, Basic operational concepts, Bus structures
Addressing modes, subroutines: parameter passing, Instruction formats, expanding opcodes method.

Unit II: BASIC PROCESSING UNIT:
Bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Microprogrammed Control, microinstruction format, Bit slice concept.

Unit III: ARITHMETIC UNIT :
Number representations and their operations, Design of Fast Adders, Signed multiplication, Booth’s Algorithm, bit-pair recoding, Integer Division, Floating point numbers and operations, guard bits and rounding.

Unit IV: THE MEMORY SYSTEM:
Various technologies used in memory design, higher order memory design, multimodal memories and interleaving, Associative Memory, Cache memory, Virtual Memory

Unit V: INPUT/OUTPUT ORGANIZATION:
I/O mapped I/O and memory mapped I/O, interrupts and interrupts handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Direct Memory Access COMPUTER PERIPHERALS: I/O devices such as magnetic disk, magnetic tape, CDROM systems.

Unit VI: RISC Philosophy:

Text Books:

References Books:

BAML206: APPLIED MATHEMATICS-III
Evaluation Scheme: Theory [4-1-0-5] Total Hrs: 45

Pre-requisite: Applied Mathematics –I, II
Co-requisite: NA
Course Objectives

1. This course introduces a general mathematical concepts and objects.
2. It skill the students to understand important mathematical models used in information technology branch.
3. This course also aim to formulate and solve the problems in daily applications of computer science

Course Outcomes

Upon successful completion of the course, students will be able to:

4. Understand the basics of mathematical concepts
5. Identify the mathematical models and its applications in information technology.
6. Solve the problems in daily applications of information technology

Course Syllabus

Unit I: Laplace Transforms

Unit II: Z-Transforms
The Z transform - definition & properties, inverse & relation with Laplace Transform. Application to z-transform to solve difference equations with constant coefficients.

Unit III: Fourier Series
Periodic function & their Fourier expansion, even & odd function, change of interval, half range expansion.

Fourier Transforms: Fourier Integral theorem, Fourier transforms and their simple properties

Unit IV: Partial Differential Equations and its application:
Partial differential equations of first order & first degree (i.e. Lagrange's form), linear homogeneous partial differential equation of nth order with constant coefficients, method of separation of variable. Simple applications.

Unit V: Random Variables
Random Variables, Distribution functions of continuous & discrete random variables, Joint distributions, mathematical expectations, moment, Moment generating function & characteristic function.

Unit VI: Special probability distribution
Geometric, Biomialal, Poisson’s, normal, Exponential, Uniform, Weibul probability distribution. Random processes resemble average & temporal average, Auto correlation & Ross correlation, stationary random process, power spectrum stationary processes & ergodic Random process.

Text Books:

References
1. Mathematics for Engineer, Chandrika Prasad
2. Advanced Mathematics for Engineer, Chandrika Prasad
7. Applied Mathematics Volume 1: J. N. Wartikar & P. N. Wartikar

BITL201: INTRODUCTION TO INTERNET PROGRAMMING
Evaluation Scheme: Theory [3-0-2-5]
Total Hrs: 45

Pre-requisite: Basic of Computing
Co-requisite: Object Oriented Programming through C++

Course Objectives

1. This course introduces student's basic programming concepts of Java.
2. It is aimed at developing skills to built real life applications.
3. This course provides carrier opportunities in software development.
4. To know about more languages like Perl and J2ee.

Course Outcomes

Upon successful completion of the course, students will be able to:

1. Understand basics of Java Programming.
2. Identify the basic constructs, technique and issues related to application development using Java.
3. Understand advanced techniques used in Java for software development.

Course Syllabus

Unit I: Basic Network

Unit II: Scripting Languages
Unit III: Javascripting (8Hrs)
Javascript In Web Pages, Writing Javascript Into Html, Programming Techniques, Operation And Expression In Javascript And Programming Constructs.

Unit IV: Dynamic Html (7Hrs)

Unit V: Perl Language (7Hrs)

Unit VI: Introducing J2ee (7Hrs)
J2ee Advantages, Enterprise Architecture Types, J2ee Components, Containers, Types Of J2ee Technology

Text books

Reference Books :
3. "Cyber Laws in India... ITA-2000 and Beyond" by Navvi
4. “Handbook Of Cyber Laws” By Sharma Vakul

BITP201: INTRODUCTION TO INTERNET PROGRAMMING
Evaluation Scheme: Practical [2P]
Total Hrs: 30

List of Practical:
1. Design a simple page and put two text inputs and a Submit button into it. Ask for the user’s name, address, city, state, zip. Arrange things neatly in a borderless table so everything lines up and looks nice and neat.
2. Find an image. Write a description of that image. Building a table from scratch put that image next to its description like put in a table. Then, find a second image, write a description for it and expand your table to fit this second image & description.
3. Design a simple page showing name of a shop, and having list of different items along with description button and the description button should provide link of different pages to show description of different items.
4. Design a page with a heading. Make the heading large, bold and italic and center it across the top of the page. Write a short paragraph or two telling a little about GHRCE. In your description, highlight something in italics. Using an unordered bulleted list, list the various departments in GHRCE.
5. Create a simple page introducing your technical area of interest. Then include a bullet list of What you do in that area and put list of 5 recent developments in that area.
6. Create a simple page introducing your technical area of interest. Then include a bullet list of What you do in that area and put list of 5 recent developments in that area.
7. Design a web page to show Javascript Animation.
8. Design a page that will show flash news or updates of your institute and that also cancels that news that is recently changed.
9. Design a page to demonstrate the cascading style sheet in HTML.
10. Design a page to demonstrate marquee hyperlinks in HTML.
11. Design a website for an Engineering college.
12. Create a Blog of your own information.
13. Design a website for latest information regarding competitive exams like GATE, GRE, etc. Also maintain valid database for the same and provide periodic test series for the students.
15. Open Ended

BITL202: OBJECT ORIENTED PROGRAMMING THROUGH C++
Evaluation Scheme: Theory [3-1-2-6]
Total Hrs: 45

Pre-requisite: Basic of Computing
Co-requisite: Data Structure Using C

Course Objectives
1. This course introduces student’s general idea and concepts of object oriented programming.
2. It is also aimed at developing skills to implement these concepts.
3. The course provide carrier opportunities in design of some applications as object oriented concepts plays dominant role in software development.

Course Outcomes
Upon successful completion of the course, students will be able to:
1. Understand Basics of object oriented programming.
2. Develop applications using these concepts.
3. Understand advanced technique such as handling templates, Exceptions and Dynamic allocations of memory.

Course Syllabus
Unit-I: Principles Of Object Oriented Programming: (08 Hrs)
Differences between C and C++.A look at procedure Oriented programming, object oriented programming paradigm, basic concepts of OOP, Benefits of OOP, OO languages, A sample program, structure of C++ program. Introduction to OOPs :The origins of C++, What is Object Oriented Programming?, Some C++ fundamentals, Headers & Name Spaces, Introducing C++ Classes, Function overloading, Operator overloading, inheritance, Constructors & Destructors, Function & Operator Overloading:

Unit-II: Overloading (10 Hrs)
constructor functions, Localizing variables, Function overloading & Ambiguity, Finding the address of an overloaded function, this Pointer, Operator overloading, References, Using reference to overload a unary operator, Overloading [], overloading ( ), Applying operator overloading.

Unit-III: Inheritance, Virtual Functions and polymorphism (06 Hrs)
Inheritance and the access specifies, Constructors and Destructors in derived classes, Multiple Inheritance, Passing parameters to a basic class, Pointers and references to derived types, Virtual Functions, Why virtual functions?, Pure virtual functions and abstract types, Early Vs Late binding.

Unit-IV: Static & Dynamic allocation (08 Hrs)
Static & Dynamic allocation using new and delete, static class members, Virtual base classes, const member functions and mutable, volatile member functions, Using the asm keyword, linkage specification, The .* and ->* operators, Creating conversion functions, Copy constructors, Granting access, namespaces, Explicit constructors, typename and export.

Unit-V Templates: (05 Hrs)
Class templates, class templates with multiple parameters, function templates, function templates with multiple parameters,

Unit-VI: Exceptions Handling (08 Hrs)
Exception Handling, fundamentals, options the uncaught exception (), Applying exception Handling, and RTTI, casting operators, Recent trends in Object Oriented Programming in C++, Advanced topics & its Application

Text books:

Reference Books:
1. Let’s C++ by Y. Kanetkar, BPB publications
2. Object oriented programming with C++, E Balagurusamy, 4th edition, TMH

BITP202: OBJECT ORIENTED PROGRAMMING THROUGH C++

Evaluation Scheme: Practical [Total Hrs: 30]
List of Practicals:-

a. Write a Program to accept a number and display whether the number is even or odd.
b. Prepare salary chart of an employee using Structures.
c. Write a program to declare a class ‘Account’ having data members as account no and balance. Accept this data for 10 accounts and display data of accounts having balance greater than 5000.
d. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
e. Write a program to define Class using constructor & destructor.(Default constructor, Multiple constructor, Copy constructor, Overloaded constructor)
f. Write a Program to illustrate Multiple Inheritance.
g. Demonstrate the concept of overloading unary & binary operators.
h. Write a program to show the concept of function overloading.
i. Write A Program to illustrate Dynamic Memory Allocation using Pointers.
j. Write code to show compile time polymorphism.(static binding)
k. Write code to show run time polymorphism(dynam binding)
l. Create a class code & illustrate the use of THIS pointer.
m. Demonstrate the formatting of output using manipulators.
n. Create templates & demonstrate their use.
o. Write code to demonstrate exception handling.
p. Open Ended Practical.
a. Write a C++ program to display the Student Entry Form.
b. Write a C++ program to design a Simple Calculator. (GUI Based)
BITP203: SOFTWARE LAB

Evaluation Scheme: Practical  [4P]
Total Hrs: 60

List of Practical:
1. Introduction to shell programming.
2. Implement a program in C to demonstrate variable declaration and displaying the same using shell scripting.
3. Write shell script to demonstrate passing command line arguments.
4. If a five digit number is input through the keyboard, write a program to calculate the sum of its digits using shell script.
5. Write a shell script to reverse a number supplied by a user.
6. Write a shell script which receives two filenames as arguments. It should check whether the two file’s contents are same or not. If they are same then second file should be deleted.
7. A shell script can receive an argument ‘one’, ‘two’ or ‘three’. If the argument supplied is ‘one’ display it in bold, if it is ‘two’ display it in reverse video and if it is ‘three’ make it blink on the screen. If a wrong argument is supplied report it. Use an else if statement.
8. Write a script to find the value of one number raised to the power of another.
9. Write a shell script to sort the given numbers in descending order using Bubble sort.
10. Write a shell script to ask your name, program name and enrollment number and print it on the screen.
11. Write a shell program to search for a given number from the list of numbers provided using binary search method.
12. Write a shell script which whenever gets executed displays the message “Good Morning/Good afternoon / Good Evening “depending on the time at which the script is executed.
13. Write a shell script that take UID as an argument and prints out person name, home directory, shell and other groups that person may belong to.
14. A file called word file consists of several words. Write a shell script which will receive a list of filenames, the first of which should be word file. The shell script should report all occurrence of each word in word file in the rest of the files supplied as arguments.
15. To perform Open end practical
1. Write a shell scripts which works similar to the UNIX commands Head Tail.
2. Write executing a shell script either the LOGNAME or the UID is supplied at the command prompt. Write a shell script to find out how many terminals has this user logged in.

MBL 102 GENERAL PROFICIENCY:-II : Foreign Language
For syallabus : please refer electronics engg. Departments syllabus in third semester

FOURTH SEMESTER

BECL303: MICROPROCESSOR BASED SYSTEMS
Evaluation Scheme: Theory   [3-1-2-6]
Total Hrs: 45
Pre-requisite: Basic Electronics
Co-requisite: NA

Course Objectives
1. This course introduces a general idea and basic digital circuits used for designing a microprocessor.
2. It is aimed at developing skills to develop assembly language programming.
3. They learn making interfacing with peripheral devices.
4. The course provides career opportunities in the subject areas of design and programming of microprocessors.

Course Outcomes:
Upon successful completion of the course, students will be able to:
1. Understand the architecture and instruction set of microprocessor.
2. Develop Assembly Language programs used in microprocessor for its operations.
3. Understand different peripheral devices and their interfacing to microprocessor.
4. Understand advanced microprocessor architecture and its programming.

Course Syllabus
Unit 1: Introduction to 8086 Microprocessor   ( 07 Hrs)
Building Concepts of Microprocessor, Introduction to 16, 32, 64 bit Microprocessor, Comparison of 8086 / 8088 CPU Architecture, Microprocessor Evolution - INTEL 8086 to Pentium with focus on- Clock Speed, Concurrent operation of EU and BIU, Memory Organization & Interfacing.

Unit 2: 8086 Programming   (07 Hrs)
Addressing modes, Instruction set, Programming examples, Pseudo Opcodes, Assembler Directives. Introduction to Software and Hardware tools. [Cross assemblers, Logic analysers, Emulators, Simulators], Architecture,

Unit 3: Co-processor interfacing   ( 07 Hrs)
8086 / 88 Maximum Mode, Architecture and Programming of 8087 and its Interfacing with 8086/8088.

Unit4: 8255 Interfacing   ( 07 Hrs)
Interfacing and programming of Peripheral 8255, Interfacing of ADC, DAC & applications. Interfacing and programming of Peripheral 8253.

Unit 5: Special Peripheral Interfacing   ( 07 Hrs)
Architecture, Interfacing and programming of Peripherals, 8251 & DMA Controllers 8237.

**Unit 6: Advanced Microprocessor study**  
(08 Hrs)
80386 Architecture, Real and Protected Mode, Register Model, Memory Management Unit, Latest trends in microprocessors systems.

**Text Books:**
1. Advanced Microprocessors & Peripherals by A.K. Ray & K.M. Bhurchandi, TMH
2. Programming & Interfacing of 8086 / 8088, D.V. Hall, TMH.

**Reference Books:**
1. Intel Reference Manuals, Microprocessor & Microcontrollers: Intel
3. Microprocessors 8086 / 88 Family Prog. Interfacing: Liu, Gibson

**BECP303: MICROPROCESSOR BASED SYSTEM**
Evaluation Scheme: Practical  
**Total Hrs: 30**

**List:**
1. Study of 8086 microprocessor, Assembler/Cross Assembler/Simulator and basic programs like addition of two 16 bit, 32 bit numbers and series addition (complete architecture, segmentation and pin diagram).
2. Write an ALP to compare a string by using string related instructions of 8086.
3. Write an assembly language program for 8086 to generate Fibonacci series and store it from memory location 0050H.
4. Write an ALP to find the Number in Memory Array.
5. Write an ALP to arrange a string in Ascending/Descending order.
6. Interface 8255 with 8086 microprocessor and write a program to glow the alternate LED’s.
7. Interface 8253 with 8086 microprocessor
8. Interface 8251 with 8086 microprocessor
9. Interface of ADC using 8255
10. Open Ended experiments on Microprocessor Interfacing

**BCSL301: THEORY OF COMPUTATION**
Evaluation Scheme: Theory  
**Total Hrs: 45**

**Pre-requisite:** NA
**Co-requisite:** Graph Theory & Combinatory

**Course Objectives:**
1. This course introduces to students general idea of finite state and automata theory.
2. Making students aware of regular languages, context free languages. And its usefulness in finite state machines.
3. It is aimed at developing skills to provide solutions to variety of real life applications which involve finite automata.

**Course Outcomes:**
Upon successful completion of the course, students will be able to
1. Understand basics of finite state and automata theory
2. Develop an appropriate technique for finite state problems and analyze them with selection of determined states and non deterministic states.
3. Identify the advanced machines designed using finite state theory

**Course Syllabus**

**Unit I:**  
(Hrs: 7)
Mathematical preliminaries – Sets, operations, relations, strings, transitive closure, count ability and diagonalisation, induction and proof methods- pigeon-hole principle and simple applications – concept of language – grammars and production rules –Chomsky hierarchy.

**Unit II:**  
(Hrs: 8)
Finite automata & regular expressions-Finite State machine, regular languages, deterministic finite automata, conversion to deterministic automata, E-closures – regular expressions, finite automata, and minimization of automata, Moore and Mealy machine and their equivalence.

**Unit III:**  
(Hrs: 7)
Regular grammar & context free grammar-Pumping lemma for regular sets- closure properties of regular sets decision properties for regular sets, equivalence between regular language and regular grammar. Context – free languages – parse trees and ambiguity , reduction of CFGS ,Chomsky and Griebach normal forms

**Unit IV :**  
(Hrs: 7)
Push – down Automata (PDA) – non Determinism – acceptance by two methods and their equivalence, conversion of PDA to CFG CFLs and PDAs- closure and decision properties of CFLs

**Unit V:**  
(Hrs: 12)
Turing machines – variants – recursively enumerable (r.e.) set – recursive sets TM as computer of function – decidability and solvability – Halting Problem – reductions – Post correspondence Problem (PCP) and unsolvability of ambiguity problem of CFGs, Church’s hypothesis, introduction to recursive function theory – primitive recursive and partial recursive functions .

**Unit VI :**  
(Hrs: 4)
Recent trends in Theory of computation, Advanced topics & its Application

**Text Books**
- Introduction Of Automata Theory, Languages and computation- J.E. Hopcroft, J.D.Ulman, Pearson education.
Reference Books
1. Introduction Of Automata Theory, Languages and computation, John Martin
3. Theory Of Computer Science –Mishra and Chandrashekharan, PHI

BAML208: GRAPH THEORY & COMBINATORICS
Evaluation Scheme: Theory [4-0-0-4]
Total Hrs: 45

Course Objectives
1. This course introduces size and kind of objects.
2. It also skills to analyze objects meeting the criteria, finding "largest", "smallest", or "optimal" objects.
3. It also introduces combinatorial structures and apply algebraic techniques to combinatorial problems.

Course Outcomes
Upon successful completion of the course, students will be able to:

1. Understand grouping of objects and operation, Relation, ordering of objects.
2. Application of Set theory.
3. Understand Groups and Rings, their types and Applications of it.
4. Data structure used to represent different kinds of objects viz Graph, Trees.
5. Understand the basics of combinatorial structure and develop algebraic technique to solve combinatorial problems.
6. Develop method to protect system from Virus, Spyware and Malware.

Course Syllabus
Unit I: (7 Hrs)
Set theory, Representation of sets on computer in terms of 0’s & 1’s. Partition & covering of a set, Product set, Relations, Graph of relation, Matrix of relation, Transitive closure & Compatible relation. Functions, Partial ordering & poset, Hasse diagram of Poset, Totally ordered set, Peano axioms & Mathematical Induction.

Unit II (8 Hrs)
Semigroup, monoid, and examples. Homomorphism, Isomorphism of semigroup. Groups, properties of groups. Permutations groups, Subgroups, Cosets, Lagranges theorem, properties of cyclic groups, generator of group, kernel of Homomorphism, quotient group, fundamental theorems & Homomorphism of groups, Residue classes & Fermats theorem.

Unit III (7 Hrs)

Unit IV (8 Hrs)
Graphs and its types, subgraph, Quotient graph, Euler path, Complete path, reach-ability, cycle, matrix representation of graph. Transitive closure of graph, Adjacency matrix, Trees, Venn diagram, Representation of trees, binary trees, spanning trees, Prims algorithm.

Unit V (7 Hrs)
Definition of generating functions and examples, proof of simple combinatorial identities, Probab. G.F. Recursive relations: definitions & examples, explicitly formula for sequence, back tracking to find explicit formula of sequence, solving recurrence relations. Counting Theorem and appl., Equivalent sets, cardinal numbers, denumerable sets. Multiplication principle of counting. Permutation & Combination with examples. The pigeon hole principle & extended pigeon hole principle and application of pigeon hole principle in solving simple problems.

Unit VI (8 Hrs)
Examples of continued fractions. Study of continued fractions. alpha has infinite continued fraction if alpha is irrational. Alpha has periodic continued fractions if alpha is quadratic irrational. Appl. to approximation of irrationals by rationals, Hurwitz’s theorem

Text books
1. Discrete Mathematical structure with application to computer science by Trembley & Manohar (Mc. Graw Hill)
2. Discrete Mathematical Structure by Kolmann, Busby & Ross (PHI)

Reference Books
c. Set Theory by Lipschutz (Schaum Series, Asian Student Edition).

BCSL404: DESIGN AND ANALYSIS OF ALGORITHMS
[4-0-2-6] Total Hrs: 45
Pre-requisite: Applied Mathematics-III
Co-requisite: NA

Course Objectives:
1. This course introduces students the general idea of analysis and design of algorithms while making them
aware of basic methods of algorithm analysis and design.
2. It is also aimed at developing skills to solve real life applications which involve algorithm development.
3. The course also provide career opportunities in analysis , design and optimization technique in algorithms

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand basic concepts of algorithm analysis and Design.
2. Identify methods used for analysis and Design of Algorithm
3. Develop an appropriate mathematical formulations in designing algorithm
4. Understand advanced techniques and tools available for algorithm analysis and development

Course Syllabus
Unit – I: Mathematical foundations (7 Hrs)
summation of arithmetic and geometric series, n, n^2, bounding summations using integration, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions, Complexity calculation of various standard functions, principles of designing algorithms

Unit – II: Asymptotic notations (8 Hrs)
Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortized analysis, application of amotorized analysis, Sorting networks, comparison networks, bitonic sorting network.

Unit – III: Advanced data structures (6 Hrs)
Advanced data structures like Fibonacci heap, Binomial heap, disjoint set representation, red and black trees and their applications.
Divide and conquer basic strategy, matrix operation, binary search, quick sort, merge sort, fast fourier transform.

Unit – IV: Greedy Method & Dynamic Programming (10 Hrs)
Greedy method – basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path etc. Dynamic Programming basic strategy, multistage graphs, all pairs shortest path, optimal binary search trees, traveling salesman problem, maximum flow networks.

Unit V: Traversal And Search Techniques (7 Hrs)
Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking basic strategy, 8-Queen’s problem, graph colouring, Hamiltonian cycles etc

Unit VI: Completeness Problems And Applications (7 Hrs)
NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, decision and optimization problems, Computational Geometry, Approximation algorithm algorithm and concepts based on approximation algorithms. Recent trends in Design and analysis of algorithms, Advanced topics & its Application.

Text Books:

Reference Books:-

BCSP404: DESIGN AND ANALYSIS OF ALGORITHMS
Evaluation Scheme: Practical [2P]
Total Hrs: 30

List of Practical:-
1. Implement the Binary search algorithm using divide & conquer technique.
2. Implement the selection sort algorithm.
3. Implement the merge sort algorithm using divide & conquer technique.
4. Implement the quick sort algorithm using divide & conquer technique.
5. Write a program to implement Matrix-chain multiplication.
6. Write a program to implement Longest common subsequence.
7. Write a program to find Huffman codes given a test set.
8. Implement the minimum cost spanning tree algorithm using kruskal’s algorithm.
9. Implement the minimum cost spanning tree algorithm using Prim’s algorithm.
10. Write a program to find all pairs shortest paths using Floyd-Warshall algorithm.
11. Write a program to implement Bellman-Ford algorithm for single source shortest path.
12. Write a program to implement Dijkstra’s algorithm for single source shortest path.
13. Write a program to implement Strassen’s algorithm for matrix multiplication.
14. Write a program to implement Ford Fulkerson algorithm for maximum flow network.
15. Write a program to implement DFS and BFS.
16. Open ended practical.

BECL210: ANALOG AND DIGITAL COMMUNICATION
[4-0-2-6] Total Hrs: 45

Pre-requisite: Basic Electronics
Co-requisite: NA
Course Objectives
1. To link the fundamental concepts and theory of electronic communication practice.
2. To apply methods of mathematical analysis for signal processing and modulation processes.
3. To become well versed in analog and digital modulation methods.

**Course Outcomes**

Upon successful completion of the course, students will be able to:

1. Enhance basic concepts of electronic communication systems.
2. Code small programs on modulation and waveform.
3. Helps to understand information sending methods.

**Course Syllabus**

**Unit I: Introduction To Communication** (07Hrs)

Block Schematic of Communication System, Base Band Signals and their bandwidth requirements, RF Bands, Types of Communication Channels [Transmission Lines, Parallel wires, Co-axial Cables, Waveguides and Optical Fiber]. Concept of Radiation and Electromagnetic waves , Mechanism of Propagations : Ground Wave, Sky Wave, Space Wave, Duct, Tropospheric Scatter and Extraterrestrial Propagation. Concept of Fading and diversity reception, Noise Figure Calculations.

**Unit II: Amplitude Modulation And Detection** (07 Hrs)

AM Modulators series plate modulated class C amplifiers, efficiency & power calculations, SSB modulation SSB-SC modulation AM demodulators,square law detector, diode peak detector, envelop detector, detectors for SSB and SSB-SC- AM signals, AM using transistors, Block Diagram of AM Receiver, AM Detection : Envelope detection, Synchronous detection, Practical diode detection, AGC, SSB and DSB detection methods.

**Unit III: Frequency Modulation And Radio Receivers** (08Hrs)


**Unit IV: Introduction To Pulse Modulation And Waveform Coding** (08 Hrs)


**Unit 5: Source Coding And Transmission Methods** (06 Hrs)

Data formats - Unipolar and Polar NRZ, RZ, Bipolar [AMI], Manchester, Synchronization -Bit and Frame, Scrambling-Unscrambling, Information theory, Huffman and L – Z encoding algorithm, channel coding Theorem, convolution, encoding and decoding, distance properties, Viterbi algorithm and Fano algorithm. Trellis coded modulation methods.

**Unit 6: Block and convolution channel codes** (7Hrs)

Linear block codes, generator matrix and parity check matrix, some specific linear block codes, cyclic codes, transfer function of a convolution code, optimum decoding of convolution codes- Viterbi algorithm distance properties of binary convolution codes

**Text Books:**

1 Communication Electronics: -Kennedy,TMH

**Reference Book:**

1.Digital Communication: John G. Prokis [TMG]
2.Digital Communication: Simon Haykin [WEP]
3. Communication Electronics: - Forest Barker,IBT
4. Radio Communication: - Miller
5. Principle of communication Systems: Taup & Smilliery TMH
6. Communication Electronics: Roddy & Coolen PHI
7. Modern communication systems [Principles and application]: Leon W. Couch II [PHI]
8. Digital communication: Shanmugh.

BECP210: ANALOG AND DIGITAL COMMUNICATION

**Evaluation Scheme: Practical** [2P]

**Total Hrs:** 30

**Practical List:**

1. Generation of Amplitude Modulation using transistor BC 548 and Calculate modulation index. and also Perform MATLAB simulation.
2. Generate Amplitude Demodulation using Envelope Detector and observe the result on Spectrum Analyzer. and also perform MATLAB simulation
3. Generation of Frequency Modulation and demodulation using MATLAB.
4. Generation of Pre-emphasis circuit on breadboard system & to plot pre-emphasis curve..
5. Generation of De-emphasis circuit on breadboard system & to plot de-emphasis curve..
6. Generation of frequency shift keying and observation of mark and space frequency using MATLAB.
7. Generation of Pulse Width Modulation(PWM) signal using IC 555 on breadboard.
8. Generation of Pulse Amplitude Modulation(PAM) signal using IC 555 on breadboard.
9. Generation of Pulse Position Modulation (PPM) signal using IC 555 on breadboard
10. Verify pulse Code Modulation (PCM) using simulation in MATLAB
11. Perform Simulation of all types of pulse modulation on Microcap.

MBL103 GENERAL PROFICIENCY-III : Hobby classes
For syllabus: please refer electronics engg. Departments syllabus in fourth semester

Semester –V
BITL301 JAVA PROGRAMMING [3-0-2-5]
Total Hours: 45
Pre-requisite: Object Oriented programming Through C++
Co-requisite: NA
Course Objectives
1. This course introduces student’s basic programming concepts of Java.
2. It is aimed at developing skills to built real life applications.
3. This course provides career opportunities in network programming and socket programming.

Course Outcomes
Upon successful completion of the course, students will be able to:
1. Understand basics of Java Programming.
2. Identify the basic constructs, technique and issues related to application development using Java.
3. Understand advanced techniques used in network programming and socket programming.

Course Syllabus
Unit I: Introduction to JAVA, Class and Object (3 hours)
Introduction to data types, operators and control statements, Classes: fundamentals of classes, declaring objects, assigning objects, reference variables, methods, constructor, variable handling and garbage collection. Methods and classes: Overloading methods, using objects as parameters, arguments passing, returning objects, recursion, access control, understanding static, introducing final, nested inner classes, storage classes, command line arguments.

Unit II: JAVA Packages, Interface and Exception Handling (6 hours)
Packages and interface: Packages, access protection, importing packages, interfaces. Exception handling: Fundamentals exception types, uncaught exception, try-catch, displaying description of an exception, multiple catch clauses, nested try statements. throw, throws, finally, built in exceptions, creating own exception subclasses.

Unit III: Multithreaded Programming (9 hours)
JAVA thread model, thread priorities, synchronization, messaging, the thread class, runnable interface, creating thread, creating multiple thread. using isAlive( ), join( ), thread priority, synchronization, interthread communication, suspending, resuming, stopping threads using multithreading.

Unit IV: I/O, Applet and String Handling (12 hours)
I/O stream, bytes stream, character stream, pre-defined streams, reading console input reading character, reading string, writing console output, the PrintWriter class, reading and writing files, applets fundamentals, transient and volatile modifiers, using instance of strictfp, native method. String Handling: string constructor, special string operator, character extraction, string comparison, searching string, modifying a string, data conversion using valueOf( ), changing case of Characters within a string, string buffer.

Unit V: Networking and Generics (12 hours)
Networking: networking basics & socket overview, client/server, reserved socket, proxy server, internet addressing, networking classes and interfaces, factory methods and instance method TCP/IP client socket, URL, URL connections, TCP/IP server socket, datagram. Generics: General form of generic class and examples, creating generic method, generic interfaces, class hierarchies, erasure, generic restrictions.

Unit VI: Recent Trends (3 hours)
Recent trends and advance topics.

Text Books:
1. The Complete Reference by Herbert Schild, TMH Publication

Reference Books:

BITP301 JAVA PROGRAMMING Total Hours: 20
Evaluation Scheme: Practical
1. Write a program to implement a class, an object and illustrate use of constructor.
2. Write a program to implement method overloading concept.
3. Write a program to take input as number from command-line and to reverse that number.
4. Write a program to implement multilevel inheritance.
5. Write a program to implement package concept
6. Write a program to implement multiple inheritance.
7. Define a method factorial to find factorial of given number and throws a user defined exception if a given no is negative.
8. Write a program to create multiple child thread for addition, subtraction, multiplication and division operations and concurrently execute the process of all the child thread with main thread by using runnable interface.
9. Write a program to create multiple child thread for addition, subtraction, multiplication and division operations and concurrently execute the process of all the child thread with main thread by using thread class.
10. Write a program to demonstrate isAlive() and join() method.
11. Write a program to set priorities for running thread.
12. Write a program to implement applet.
13. Write a program to copy content of one file to another file.
14. Write a program to implement String and StringBuffer class
15. Write a program to implement TCP/IP client socket and TCP/IP server socket.
16. Open ended practical on recent trends in JAVA.

BCSL303 DATABASE MANAGEMENT SYSTEMS
[3-0-2-5]
Total Hours: 45 hours
Pre-requisite: Data Structure Using C
Co-requisite: NA

Course Objectives:
1. This course introduces general idea of database management system.
2. It is aimed at developing skills to design databases using data modeling and design techniques.
3. It is also aimed to developing skills to implement real life applications which involve database handling.
4. This course also provide carrier opportunities in subject areas of designing, storage techniques and data handling and managing techniques

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand Basics of database management system
2. Identify data models and design techniques involved in the database design process
3. Develop an applications for handling data in real life applications.
4. Understand advanced storage methods, indexing techniques, optimization techniques, transaction management processes in database handling.

Course Syllabus

Unit I: Database system concepts and Architecture (8 Hrs)
Concept of relational database, Relational data model, Relational algebra, SQL-the relational database standard, introduction to PL/SQL.

Unit II: Database Design Theory (8 Hrs)
Functional dependencies and normalization, relational database design algorithms, practical database design and demoralization, Relational constants, programmatic ways for implementing constraints, triggers.

Unit III: Physical Database Design and Memory Management in database (9 Hrs)
Concept of physical and logical hierarchy, storage, concepts of index, B trees, hash index, function index, bitmap index, database buffer management, log buffer management code reuse, concept of two tier and N-tier architecture. Database recovery technique. Aries Algorithm for recovery.

Unit IV: Query Optimization and Performance Tuning (8 Hrs)
Various techniques for query optimization, strong and weak equivalence, cost base optimization, Use of different storage structures in query optimization,

Unit V: Transaction Management (10 Hrs)
Transaction Processing -Transaction and system concepts, Desirable properties of transaction, Schedules and recoverability, serializability of schedules, concurrency control, lockbased protocols and time stamp based protocols, read consistency.

Unit VI: Trends in Database Management, (2Hrs)
What is NoSql, History of NoSQL, Important characteristics of NoSQL categories of NoSQL. Google Database, Twitter and Social networking databases

Text Books
Database System Concepts by Henry Korth and Others

Reference Books
Database Systems by S. K. Singh, Pearson Education.
Database Systems by Connolly, 3rd edition, Pearson Education

BCSP303 DATABASE MANAGEMENT SYSTEMS
Total Hours: 20 hours
Evaluation Scheme : Practical

List of Practical:-
1. To Study Architecture of DBMS.
2. To Study and execute the DDL commands.
3. To Study and execute the DML commands.
4. To study & execute Primary Key, foreign key concept
5. To study and execute for retrieving data using SELECT clause.
6. To Study and execute GROUP BY & HAVING Clause
7. To study and execute queries based on Cartesian product.
8. To study and execute various Join types & Join conditions.
9. To Study and execute the queries based on Aggregate function.
10. To Study and execute queries based on SINGLE ROW functions.
11. To Study and execute queries based on Set operators.
12. To Study and execute PL/SQL block.
15. To Study and execute commit & rollback statements.
16. To Study and execute various locking statements.

*Open ended design of Practical BCSL302 SYSTEM PROGRAMMING [2-1-0-3]

Total Hours: 45 hours

Evaluation Scheme: Theory
Pre-requisite: NA
Co-requisite: Operating System

Course Objectives:
1. This course introduces students general idea of system programming while making aware of managing linking and loading of programs in memory.
2. It is aimed at developing skills to provide solutions to applications which involve system managing.
3. The course provides carrier opportunities in design of linker, loader, Assember and .object file format.

Course Outcomes:
Upon successful completion of the course, students will be able to:
1. Understand Basic concepts of system programming.
2. Understand Utility programs, subsystems, multiple-program systems
3. To design Linker, Loader ,compiler and object file format

Course Syllabus
Unit I: Assembler (6 Hrs)
Concept of assembler, design of single pass and two pass assembler.

Unit II: Macroprocessor (8 Hrs)
Macroprocessor- Concept of macro, macro call within macro, macro definition within macro, recursive macro calls, design of macro processor.

Unit III: Linker and Loader- (7 Hrs)
Linker and Loader- Concept of static and dynamic relocation, external symbols, design of linker, design of object file for different loading schemes.

Unit IV: Common Object file format & System Utilities (8 Hrs)
Common Object file format & System Utilities- Structure of object file and executable file, section or segment headers, symbol table, concept of storage class, string various, data types line insert, character, arrays structures. Source code control system, make, link editor, symbolic debugger.

Unit V: Unix Device Drivers (7 Hrs)

Text Books:-
System Programming- Lila & Beg.
Unix Device Drivers- George Pajari , Pearson Education.

Reference Books:-
1. System Programming and Operating systems- D. M. Dhamdhere
2. Unix system Utilities manual.Unix programming Environment- Keringham and Pike, Pearson Education

BCSL302 OPERATING SYSTEMS [3-0-1-4]

Total Hours: 45

Evaluation Scheme: Theory
Pre-requisite: Computer Architecture & Organization
Co-requisite: NA

Course Objectives:
1. This course introduces general idea, structure and functions of operating system
2. Making students aware of basic mechanisms used handle processes, manages memory, manages storage devices and files.
3. The course provide career opportunities in subject areas of designing operating systems

Course Outcomes
Upon successful completion of the course, students will be able to:
1 Deliver the thoughts in an effective way.
2 Understand the social ethics and implement them to become a more acceptable professional by the industry, institute and society in general

Course Syllabus
Unit I: Introduction (06 Hrs)
Evolution of OS, Types of OS, Basic h/w support necessary for modern operating systems, services provided by OS, system programs and system calls, system design and implementation.

Unit II: File Systems (8 Hrs)

Unit III: Process And Its Scheduling (7 Hrs)
Process concept, process control block, Types of scheduler, context switch, threads, multithreading model, goals of scheduling and different scheduling algorithms,

Unit -IV: Memory Management (8 Hrs)

Unit -V: Process management and synchronization: (7 Hrs)
Concurrency conditions, Critical section problem, software and hardware solution, semaphores, conditional critical regions and monitors, classical inter process communication problems

Unit -VI : Deadlocks detection & avoidance : (8 Hrs)
Deadlock definitions, Prevention, Avoidance, detection and Recovery, Goals of Protection, access matrix, Deadlock implementation, Content beyond the syllabus (04 Hrs) Recent trends in Operating System, Introduction to Advanced OS & its Application

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand Basics of operating system
2. Identify mechanism to handle processes, memory, I/O devices, files and develop an appropriate algorithm for it.
3. Understand advanced and different types of operating systems developed and its advantages and features

Text Books:

Reference Books:

MBL104: General Proficiency-IV (Advanced Communication Skill)

Course Objectives
1. To enhance the quality of the undergraduates by introducing to them effective and advanced techniques of public speaking.
2. To enhance one to one interaction and social ethics.

SOFT COMPUTING ELECTIVE – I [4-0-0-4]

Pre-requisite: NA
Co-requisite: NA
Total Hours: 45

1. This course introduces the basics of Soft computing and its application areas particularly to Intelligent systems.
2. The course also aimed to skill the students Soft Computing and hybrid intelligent systems, Neurofuzzy systems and adaptive control systems.

Course Outcomes
Upon successful completion of the course, students will be able to
1. Understand ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
2. Understand the concepts of neural networks that can learn from available examples and generalize to form appropriate rules for inference systems
3. Provide the mathematical background for carrying out the optimization associated with neural network learning.
4. Understand concepts of genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations

Course Syllabus
Unit I: Comparison Of Soft Computing Methods (6 Hrs)

Unit II:Neural Networks (8 Hrs)

Unit III:Fuzzy Set Theory (8 Hrs)

Unit IV:Neuro-Fuzzy Modelling (7 Hrs)
Unit V: Neuro-Fuzzy Controller In Engineering Applications (9 Hrs)

Unit VI: Genetic Algorithm (5 Hrs)

Unit VII: Recent Trends and Applications (2 Hrs)
Recent trends and applications of scripting languages.

Text Books:
1. ‘Fuzzy Sets & Fuzzy Logic: Theory & Applications’ George Klir, Yuan, Prentice-hall Of India Pvt Ltd
2. ‘Neural Networks, Fuzzy Logic & Genetic Algorithms’ S Rajasekharan, S A Vijayalekshmi Pai, Prentice-Hall India,

Reference Books:
- ‘Neural Networks’ James A Freeman & David M Skapura, Pearson Education, 2002

SCRIPTING LANGUAGES ELECTIVE - I
[4-0-0-4]

Pre-requisite: Introduction to internet programming
Co-requisite: NA

Course Objectives
1. This course enables students to understand web page site planning, management and Maintenance.
2. The course explains the concept of developing advanced HTML pages with the help of frames, scripting languages, and evolving technology like DHTML.
3. The main objective behind introduction of this course is also to develop web sites which are secure and dynamic in nature and writing scripts which get executed on server as well.

Course Outcomes
Upon successful completion of the course, students will be able to:
1. Understanding of basic principles of procedural computer programming.
2. Apply understanding of programming language in order to embed scripts within HTML documents to manipulate frames, browsers, windows and images and to generate pages of HTML code dynamically.
3. Understanding of scripting and the contributions of scripting languages.

Understanding of ASP and JSP and contribution of these languages in website development

Course Syllabus
Unit -I: HTML/ DHTML (Hrs:8)
HTML & DHTML basics: Introduction, basic tags, tables, forms, frames.

Unit -II: XML (Hrs 7)
XML basics, understanding markup languages. Structures and syntax, valid. Well formed XML, DTD (document type Definition) classes. XSL: XML with style sheet basics.

Unit -III: WML (Hrs 9)
WML basics, Writing WML code, some examples, Graphics, Templates. Forms and User input: The Options Menu, Events, Variables, and Input Tags.

Unit -IV :ASP (Hrs 9)
ASP basics, ASP Overview ,Variables, Forms & Query strings, Server Variables, Sessions, Conditions/Control Flow Constructing Code: Arrays, Looping For/Loop and While/Next, Functions and Sub Procedures, VB Built In Functions, VB Script, Coding Standards: Comments, Naming Conventions, Indenting, Modular, Debugging, Error Handling, Includes Organizing Code. Object Types, Automated Tasks Working with Databases: MS Access/Database Concepts, SQL, ADO, and Reading from a table.

Unit -V:JSP (Hrs 9)
JSP basics, Course Introduction, Creating a Common Navigation Bar : Plan a Common Navigation Bar, Create Common Elements, Dynamically Change the Display of Common Navigation Elements, Building a Login System: Plan the Login System's Logic, Create a Registration Form, Java script, Validate Form Data, Store and Retrieve Session Data, Update a Database with User Data, Personalizing a Site: Plan a Personalization System, Store Data in a Cookie, Retrieve and Use Cookie Data Test for Live Session Data, Destroy a Session.

Unit -VI : Recent Trends And Applications (Hrs 3)
Recent trends and applications of scripting languages.

Text Books:
1. XML in action web technology by William J. Pardi (P1-LI Pub.)
2. Complete reference for HTML & DHTML.

Reference Books:
3. WAP 'A beginners Guide'---------- Dale Bulbrook
4. WAP Development with WML and WML Script------- Ben Forta And Keith
MANAGEMENT INFORMATION SYSTEM ELECTIVE – I
[4-0-0-4] Total Hours: 45 hours

Pre-requisite: NA
Co-requisite: NA

Course Objectives
1. To study Meaning, nature and scope of MIS,
2. Planning with MIS, meaning, nature & feature of organization, nature of conceptual design of an MIS,
3. Organization for implementation of MIS.

Course Outcome
Upon successful completion of the course, students will be able to:
1. Get idea how to manage large amount information, how to implement MIS for organization.
2. How to handle large data through automated systems.

Course Syllabus
Unit I: (Hrs:8) Meaning, nature and scope of MIS, decision support, systems approach, the system view of business, MIS organization with in industrial and business unit, managers views of information system, development of management organizational theory, management and organization, behavior, information, data.

Unit II (Hrs:7) Planning with MIS, need for planning, characteristic of plan, strategy & development of plan, role of MIS in strategy development & strategy planning decision, from strategic plans to short range plans.

Unit III: (Hrs: 9) Meaning, nature & feature of organization, organization and information system structure, management & decision making and MIS, MIS as a technique for mailing programmed decision & non-programmed decision assisting information system.

Unit IV: (Hrs:9) Nature of conceptual design of an MIS. Preparing member of the organization for change, studying, managerial and functional process systems, determining information needs, determining information sources, outlining general information flow and database system, hardware and software configuration, documenting the conceptual design.

Unit V: (Hrs:8) Organization for implementation, planning the implementation, organization training and development, acquisition, conversion, testing, operation, evaluation and maintenances.

Unit VI: Recent Trends and Applications (Hrs 3) Recent trends and advance topics.

Text Books:
2. Management Information Systems by S. Sadagopan (PHI Pub.)

Reference Books:
3. Management Information Systems by James A. Obrien (Galgotia Pub.)
5. Management Information Systems by A. K. Gupta (S. Chand Pub.)

BITL309 CYBER LAWS ELECTIVE - I
[4-0-0-4] Total Hours: 45 hours

Pre-requisite: NA
Co-requisite: NA

Course Objectives
1. This course introduces students a critical understanding of Cyber Law.
2. This course also aimed to develop skill for dealing with frauds, deceptions (confidence tricks, scams) and other cyber crimes such as child pornography, that are taking place via Internet.
3. This course also explores the legal and policy development in various countries to regulate Cyberspace.

Course Outcomes
Upon successful completion of the course, students will be able to
1. Identify the emerging legal issues in a digital networked environment including general issues of jurisdiction and enforcement of rights and liabilities in cyberspace;
2. Consider developments in specific areas of law arising in cyberspace including intellectual property, regulation of content /censorship, privacy and electronic commerce;
3. Understand and evaluate how these developing concepts affect the flow of information in society and the work of information professionals;
4. Identify and analyze recent developments in national and global information policy, the nature of the policy making process and the identities and positions of the various stakeholders;
5. Consider the role of the information professions in this policy making process; and Identify and evaluate resources and materials treating the Law of Cyberspace and IPR.

Course Syllabus
Unit-I (Hrs:8) Introduction:
Basic Concepts of Technology and Law Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence

Unit-II (Hrs:8) Recent Trends and Applications
Basic Concepts of Technology and Law Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence

Unit-III: (Hrs:9)

Unit-IV: (Hrs:9)

Unit-V: (Hrs:8)
Cyber Law Issues for Management: Cyber Law Issues in E-Business Management, Major issues in Cyber Evidence Management, Cyber Law Compliancy Audit

Unit-VI: Recent Trends And Applications (Hrs:3)
Recent trends and advance topics.

Text Books:

Reference Books:
1. "Cyber Laws in India.. ITA-2000 and Beyond" by Navvi
3. “Handbook Of Cyber Laws” By Sharma Vakul

BCSL312 COMPUTER GRAPHICS & VISUALIZATION
ELECTIVE - I
[4-0-0-4] Total Hours: 45 hours

Pre-requisite: NA
Co-requisite: NA

Course Objectives
1. This course introduces basic fundamentals of computer graphics while making them aware of basic principles of computer graphics.
2. It is also aimed at developing fundamental data structure and algorithm for modeling.
3. This course also provide career opportunities in developing Video Games, Virtual Reality applications, computer simulation, computer aided design and web design.

Course Outcomes
Upon successful completion of the course, students will be able to
1. Understand basics of computer graphics.
2. Identify the basic methods for digitally synthesizing and manipulating visual contents.
3. Develop an appropriate mathematical formulation for image generation and manipulation.
4. Understand advanced techniques and tools in the area of computer graphics.

Unit-I: Introduction (Hrs: 7)
Introduction to Computer Graphics and Image Processing, Basic fundamentals of random scan, raster scan devices, Stereoscopic and Virtual Reality Systems, line and circle drawing algorithms

Unit-II: Polygon Filling Methods (Hrs: 8)
Seed fill, fence fill, edge flag algorithm, scan conversion techniques, aliasing and animalizing techniques, clipping algorithms

Unit-III: Transformations (Hrs:9)
Basic 2D transformation, composite transformations-translation, rotation, scaling, reflection, shear views, windowing, Introduction to 3D transformation

Unit-IV: Projections And Eliminations (Hrs:8)
Three dimensional display methods, parallel, perspective projections and types, hidden line and surface elimination techniques, shading and rendering.

Unit-V: Curve Generation (Hrs: 10)
Curve Generation: Cubic Spine, Braziers, B-Spline, blending of curves and other interpolation techniques, Introduction to Visualization, Applications, Visualization Techniques- parallel coordinates – a, charts (pie chart, bar chart, histogram, function graph, scatter plot, etc.), graphs (tree diagram, network diagram, flowchart, existential graph, etc.) Venn diagram Euler diagram etc.

Unit-VI: Trends and Applications (Hrs:3)
Recent trends in Computer Graphics and Visualization, Advanced topics & its Application

Text Books:

Reference Books:

MBL 104 GENERAL PROFICIENCY-IV (Advanced Communication Skill)
For syllabus : please refer electronics engg. Departments syllabus fifth semester

Semester -VI
SOFTWARE ENGINEERING [3-0-2-5] Total Hours: 36 hours
Evaluation Scheme : Theory
Pre-requisite: NA
Co-requisite: NA

Course Objectives
1. This course introduces basic idea of software engineering while making them aware of basic mechanism of software engineering.

2. It is aimed at developing skills to provide development solutions to variety of real life situations which involve software engineering.

3. Students learn appropriate cost estimations for developed software.

4. This course provides career opportunities in subject area of software requirement, software design, and software testing quality management, Configuration management.

Course Outcomes
Upon successful completion of the course, students will be able to:

1. Understand Basics of software engineering
2. Identify life cycle models involved in designing software.
3. Develop an appropriate design technique for software development problems and analyze them with proper requirements
   • Understand advanced development technique and tools in software analysis, modeling, design and testing software
4. To be aware of different life cycle models, requirement dictation process, analysis modeling and specification, architectural and detailed design methods implementation and testing strategies, verification and validation techniques, Project planning and management, Use of CASE tools

Course Syllabus
Unit-I: (4 Hrs)
Software and software engineering. The importance of software, software-software myths, software engineering paradigms, generic view of software egg, software metrics, measures and metrics, estimation, risk analysis, scheduling, size oriented metrics; function oriented metrics, metrics of software quality.

Unit-II: (6 Hrs)
Software project estimation and planning, decomposition techniques, LOC and FP estimation, effect estimation, risk analysis, identification, projection, assessment, management and monitoring, software reengineering, requirement analysis, tasks, analyst, software prototyping, specification principles, representation and the software requirements specification.

Unit-III: (8 Hrs)
Object oriented analysis and data modeling object oriented concepts, identifying objects, specifying attributes, defining operations, inter object communication finalizing object definition, object oriented analysis modeling, data modeling, data objects, attributes and relationships, entity relationship diagrams, alternative analysis techniques, requirement analysis methods, data structure oriented methods, data structured system development, Warner diagrams and the DSSD approach, Jackson system development.

Unit-IV: (7 Hrs)
Software design fundamentals, The design process, design fundamentals, effective modular, design dataflow oriented design, transform analysis, transaction analysis, design heuristics, object oriented design. Object oriented design concepts, object oriented design methods. Refining operations, program components & interfaces, implementation detail design, User interface design, human factors, human computer interface design, interface design guidelines, interface standards.

Unit-V: (7 Hrs)
Software quality assurance, software quality factors, quality assurance, quality metrics, Halstead’s S/W science, software testing techniques, S/W testing fundamentals; White box testing, black box-testing, validation testing, system testing, debugging software maintenance maintainability, maintenance tasks, reverse engineering and re-engineering.

Unit VI: Recent Trends And Applications (3 Hrs)
Recent trends and advance topics

Text Book

Reference Books:

SOFTWARE ENGINEERING
Total Hours: 20 hours
Evaluation Scheme: Practical

Practical list
1. To study Software requirement Specification and write a document for the same.
2. To study Functional and Non-functional requirements and write a document for the same.
3. Introduction to Rational rose software.
4. Design a Use case diagram for Hotel management/ Medical store.
5. Design a Class diagrams for Hotel management/ Medical store.
6. Design a Sequence diagrams for Hotel management/ Medical store.
7. Design a Collaboration diagrams for Hotel management/ Medical store.
8. Design a State chart diagrams for Hotel management/ Medical store.
9. Design an Activity diagrams for Hotel management/ Medical store.
10. Design a Component diagrams for Hotel management/ Medical store.
11. Design a Deployment diagrams for Hotel management/ Medical store.
12. Open Ended practical.
COMPUTER SYSTEM SECURITY  [3-0-1-4]  
Total Hours: 45 hours
Pre-requisite: Computer Networks
Co-requisite: NA
Course Objectives
1. This course covers the fundamentals of computer systems security.
2. It introduces many different areas of security such as encryption, malicious code, authentication and access control, trusted computer systems, operating system and network security.
3. The objective of this course is to provide students with a comprehensive overview of the threats to computer security, technologies for security assurance, and engineering approaches to security solutions.

Course Outcomes
Upon successful completion of the course, students will be able to:
1. Understand and learn how to use encryption.
2. Identify and use appropriate protection measures against malicious code.
3. Apply the modern principles of physical security, authentication, and access control.
4. Learn design principles behind trusted systems, their features and the appropriate degree of assurance.
5. Be able to plan, implement, and assess security protection mechanisms in computer systems and networks.

Course Syllabus

Unit -I: (7 Hrs)
Introduction: attacks, services, mechanisms, security attacks, security services, a model for internet work security, encryption model, steganography, classical encryption techniques, modern techniques - simplified DES, block cipher principles, data encryption standard, strength of DES, differential & linear cryptanalysis, block cipher design principles, block cipher modes of operation, Algorithm - triple DES, international data encryption algorithm, blowfish, RCS, CAST, RC2, characteristics of advanced symmetric block ciphers.

Unit -II: (8 Hrs)
Confidentiality using conventional encryption: placement of encryption function, traffic confidentiality, key distribution, random number generation. Public key cryptography: principles, RSA algorithm, key management, diffie-hellman key exchange, elliptic curve remainder theorem, discrete logarithms.

Unit -III: (7 Hrs)

Unit -IV: (8 Hrs)
Networks security practice: authentication applications - kerberos. X.509 directory authentication service, Kerberos encryption techniques, E-mail security: pretty Good privacy, S/MIME, data compression using ZIP Radix-64 conversion. PGP random number generation, IP security: overview, architecture, authentication header, encapsulating security payload, combining security associations, key management.

Unit -V: (7 Hrs)

Unit - VI: Recent Trends And Applications in cryptography (3Hrs)
Recent trends and advance topics

Text Books:

Reference Books:
2. Introduction to Data Compression 2/c by Khalid Sayood (Morgan kaufmann/Harcourt India)

LANGUAGE PROCESSORS  [3-0-2-5]  
Total Hours: 35 hours

Pre-requisite: Theory of Computation
Co-requisite: NA
Course Objectives :
1. This course introduces student’s general idea of language processors
2. This course also introduces designing structure and implementation of it.
3. They are also aimed to develop skills to understand optimization technique.

Course Outcomes:
Upon successful completion of the course, students will be able to:
1. Understand basic concepts of language construct
2. Identify design structure of language processors
3. Develop an implementation algorithm for language construct.
4. Understand optimization of codes and runtime environment.

Course Syllabus

Unit I: Introduction (Hrs: 6)
Compilers and translators, Phases of compiler design, cross compiler, Bootstrapping, Design of Lexical analyzer, LEX.

Unit II: Syntax Analysis (Hrs:6)
Specification of syntax of programming languages using CFG, Top-down parser, design of LL (1) parser, bottom up parsing technique, LR parsing algorithm, Design of SLR, LALR, CLR parsers, Study of YACC.

Unit III: Syntax Directed Translation (Hrs:7)
Study of syntax directed definitions & syntax directed translation schemes, implementation of SDTS, intermediate notations: postfix, syntax tree, TAC, translation of expression, controls structures, declarations, procedure calls, and Array reference.

Unit IV: Storage Allocation And Error Handling (Hrs:7)
Run time storage administration, stack allocation, symbol table management, Error detection and recovery: lexical, syntactic, semantic.

Unit V: Code Optimization (Hrs:6)
Important code optimization techniques, loop optimization, control flow analysis, data flow analysis, Loop invariant computation, Induction variable removal, Elimination of Common sub expression, Code generation – Problems in code generation, Simple code generator, Register allocation and assignment, Code generation from DAG, Peephole optimization.

Unit VI: Trends in Language Processor (Hrs:3)
Recent trends in Language Processor, Compiler tools, Advanced topics & its Application

Text Books:

Reference book:

BCSP308 LANGUAGE PROCESSORS
Total Hours: 20 hours

Evaluation Scheme: Practical
List of Practical:
1. Assignment to understand the syntax of LEX specifications built-in functions and variables
2. Write a LEX program to convert a number in words to integer.
3. Write a Lex Program to count no. of words & Characters supplied at a command prompt.
4. Write a lex program to identify keywords of C language.
5. What is LEX and YACC. Write a Lex Program to Count no. of lines & blanks supplied at a command prompt.
6. Write LEX specification to generate a lexical analyzer that will capitalize all the identifier names in a given program.
7. Assignment to understand the syntax of YACC specifications built-in functions and variables
8. Write a LEX program for basic desktop calculator using YACC
9. Implement a lexical analyzer in “C”
10. Write a procedure for recursive descent parser for the grammar
   a. S ® T $
   b. T ® [ T ] | [ T ] T | ] T | [ ]

11. Write a program to find FIRST and FOLLOW set of all non-terminals in the grammar input through keyboard or read from file.
12. Write a program to construct LL (1) parsing table for the grammar input through keyboard or read from file.
13. Justify bottom-up parsing technique is more-efficient than Top-down approach
14. Left recursive grammar is not suitable for Top-down parsing” explain with suitable example

*Open ended design of Practical.

ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT [3-0-0-3]
Total Hours: 45 hours

Pre-requisite: Management Information System
Co-requisite: NA

Course Objectives
1. This course introduces the quantitative approach to engineering decision making while making aware of fundamentals of engineering economics.
2. Students will be aware of industrial product management.

Course Outcomes
Upon successful completion of the course, students will be able to
1. Understand general problem-solving process.
2. Understand the basic cost concepts used in economic analyses.
3. Understand the concepts of the time value of money and economic equivalence.
4. Understand the commonly used methods for comparing investment alternatives.
5. Understand the techniques for incorporating depreciation and income tax calculations into economic analyses.
6. Understand the procedures for performing benefit-cost analyses of projects in the public sector.

Course Syllabus
Unit I: (07 Hrs)
Demand Utility and indifference curves, Approach to Analysis of demand, elasticity of demand, Measure of demand elasticity, Factors of Production, Advertising elasticity, Marginalize.

Unit II (08 Hrs)
Laws of Return and costs, price and output determination under perfect competition, monopoly, monopolistic competition, oligopoly, Depreciation and methods for its determination.

**Unit III** (7 Hrs)
Functions of central and commercial banks Inflation, Deflation, Stagflation, Direct and Indirect Taxes, Monetary and cycles, New economic policy, Liberalization, Globalization, Privatization, Market friendly state. Fiscal policy of the government, Meaning and phases of business.

**UNIT IV** (8 Hrs)
Definition, Nature and scope of management, Functions of management- Planning, organizing, Directing, Controlling, Communicating

**Unit V** (07 Hrs)
Meaning of marketing management, Concept of marketing, Marketing Mix, Administrative and cost plus pricing, Channel of distribution, Advertising and sales promotion.

**Unit VI** (08 Hrs)

**Text Books**
1. Modern Economics by H.L.Ahuja, S. Chand & Co.

**Reference Book**
:Monitory economics by M.L.Seth
5. Managerial economics by Joel dean, Prentice Hall India.
7. Marketing Management by Philip Kotler
9. Financial Management by I.M. Pandey

**OPEN ELECTIVES**
For syllabus of open elective subjects, please refer syllabus provided in B.E. ( Electronics Engineering ) programme - Sixth Semester

**MBL105 General Proficiency –V "Employability Skills & Technical Report Writing"**
For syllabus : please refer electronics engg. Departments syllabus in sixth semester

**MBL 106 General Proficiency –VI Research Methodology Workshop**

For syllabus : please refer electronics engg. Departments syllabus in sixth semester

**DIGITAL IMAGE PROCESSING ELECTIVE-II**
[ 4-0-0-4] Total Hours: 45

**Pre-requisite: NA**

**Co-requisite: NA**

**Course Objectives:**
1. To provide image fundamentals and mathematical transforms necessary for image processing.
2. To gain information of various transform techniques.
3. To give information of basic morphological algorithms
4. To understand various image processing techniques

**Course Outcomes:**
Upon successful completion of the course, students will be able to
1. Understand theoretical foundations for of digital image processing; appreciate modern applications;
2. Implement algorithms for image enhancement, filtering, restoration

**Course Syllabus**

**Unit I:** (7 Hrs)
Origins of digital image processing, Various Imaging techniques, components of an image processing system, Image sensing and acquisition, Image sampling and quantization, neighbors of a pixel, Adjacency, Connectivity, Regions and boundaries.

**Unit II:** (7 Hrs)
Basic intensity transformation and spatial filtering, Image negatives, log transforms, power-law transformations, median filtering, Histogram equalization, Histogram matching, spatial correlation and convolutions

**Unit III:** (7 Hrs)
Two-dimensional orthogonal and Unitary Transforms, properties of unitary transforms 2D-DFT, Cosine transforms, Sine transforms, Hadamard transform, Haar transforms, Slant transforms.

**Unit IV:** (8 Hrs)
Model of image Degradation/Restoration process, Noise models, Restoration in the presence of noise only, periodic noise reduction by Frequency domain filtering, Image reconstruction from Projections, Image compression models, Huffman coding, LZW coding, Run length coding, Bit-plane coding.

**Unit V:** (8 Hrs)
Some basic morphological algorithms, Boundary extraction, convex hull, thinning, skeletons, morphological Reconstruction. Color image processing, color models, RGB color models, CMY and CMYK color models the HSI color models.

**Unit VI:** (8 Hrs)
Image segmentation, Fundamentals, Point, Line and edge detection, of segmentation, Thresholding, Region-based segmentation, watershed segmentation algorithm. Applications of segmentation.

Advanced topics on Image processing technology and algorithms.

**Text Books:**

**Reference Books:**

**MULTIMEDIA SYSTEMS ELECTIVE-II [4-0-0-4]**
**Total Hours: 45**

**Evaluation Scheme: Theory**

**Pre-requisite:** NA
**Co-requisite:** NA

**Course Objectives**
1. Students will be able to understand the relevance and underlining of the Infrastructure of multimedia system.
2. Students will be able to understand the processing, storage, generation, manipulation and rendition of multimedia information.

**Course Outcomes**
Upon successful completion of the course, students will be able to
1. Understand the basics of multimedia systems like audio, video, image, text, tools, etc.
2. Identify the exact need of multimedia systems involved in the real life applications.
3. Develop an appropriate multimedia tool for multimedia system problems, and analyze them, with proper selection of boundary conditions and assumptions and also understand advanced computing techniques.

**Course Syllabus**

**Unit I : (7 Hrs)**
Multimedia- definitions, CD-ROM and the multimedia highways, uses of multimedia introduction to making multimedia, the stages of projects, requirements to make good multimedia, multimedia skills and training, the multimedia tea, training opportunities in multimedia.

**Unit II : (7 Hrs)**
Multimedia hardware, Macintosh and windows production platforms, hardware peripherals connections, memory and storage devices, input devices output hardware, communication devices, media software, basic tools, making instant multimedia authoring tools.

**Unit III : (8 Hrs)**
Multimedia building blocks- text, sound, images animations, video. Assembling and delivering a project, planning and costing, designing and producing Content and talent, delivering, CD-ROM technology, DVD Tech.

**Unit IV : (7 Hrs)**
Multimedia Authoring & User Interface – Hypermedia messaging - Mobile Messaging – Hypermedia message component – Creating Hypermedia message

**Unit V : (8 Hrs)**
Multimedia and Internet- History, web servers, web browsers, VRML, working on the web: text, animation, images and sound for the web, multimedia Applications, media communication, media consumption, media entertainment and Multimedia games.

**Unit VI : (8 Hrs)**

**Text Books:**
2. Multimedia systems design by A.Aandleigh, K. Thakkar (PHI Pub.)

**Reference Books:**

**DATA MINING & WAREHOUSING ELECTIVE-II [4-0-0-4]**
**Total Hours: 45**

**Evaluation Scheme: Theory**

**Pre-requisite:** NA
**Co-requisite:** NA

**Course Objectives:**
1. This course introduces principles, concepts, functions and uses of data warehouses, data modeling and data mining in business.
2. A DW and DM technique is usually business driven and will work to improve the direction of the company by aligning the data warehouse technology with Business strategy.
3. This course also provide carrier opportunities in data warehouse design, query processing, data mining tools and technique.

**Course Outcomes**
Upon successful completion of the course, students will be able to
1. Understand the basic concept of data warehouse, data mining
2. Identify the architectural components and efficiently design and manage data storage using data warehousing.
3. Understand and implement classical algorithms in data mining. Identify the application area of algorithm and apply them.
4. Understand advanced techniques and tools in the area of data warehouse and data mining.

**Course Syllabus**

**Unit I: Introduction to Data Warehousing** (7 Hrs)
- Introduction to Decision Support System: DSS Defined, History of DSS, Ingredients of DSS, Data and Model Management, DSS Knowledge base, User Interfaces, The DSS Users, Categories and Classes of DSSs Need for data warehousing, Operational & informational data, Data Warehouse definition and characteristics, Operational Data Stores.

**Unit II: Data warehouse architecture** (7 Hrs)
- Data warehouse Components, Architectural components, Data Preprocessing: Why Preprocess Data? Data Cleaning Techniques, Data Integration and Transformation, Data Reduction Techniques, Discretization and Concept Hierarchy Generation for numeric and categorical data, significant role of metadata, Building a Data warehouse, Benefits of Data Warehousing.

**Unit III: Multidimensional data Models** (8 Hrs)

**Unit IV: Introduction to data Mining** (10 Hrs)

**Unit V: Knowledge Discovery in Large Data Sets** (10 Hrs)
- Classification, Knowledge Discovery Classification Based on Association Rule Mining, Other Classification Methods Cluster Analysis: What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Clustering Methods. Introduction to Knowledge Discovery, innovative techniques for knowledge discovery, application of those techniques to practical tasks in areas such as fraud detection, scientific data analysis, web mining, Introduction to huge data sets such as Web, telecommunications networks, relational databases, object-oriented databases, and other sources of structured and semi-structured data, Problem of Large Data sets

**Unit VI: Recent Trends in Data Mining and warehousing** (3 Hrs)
- Recent trends in Data Mining and Warehousing
- Advanced topics & its Application

**Text Book**
- Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann.

**Reference Books**

1. Paul Punnum, "Data Warehousing Fundamentals", John Wiley Pub
2. Alex Berson, S.J. Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw Hill
3. Understand advanced techniques and tools in area of E-commerce

Course Syllabus

Unit I: (7 Hrs)
Introduction to electronics-commerce: The scope of E-COM, E-COM and trade cycle, electronic market, electronic data interchange, internet commerce, E-Commerce in perspective, the value chain, supply chains, Electronics Commerce Software: What kind of software solutions do you need? marketing smarts, hosting services, basic packages, midrange package, enterprise solutions for large firms.(8)

Unit II: (7 Hrs)
Business to Business Electronics-commerce: Inter-organizational transactions, electronics, electronics markets, electronics data interchange (EDI), EDI-technology, EDI and business, inter organizational e-com.(8)

Unit III: (7 Hrs)
Business to consumer electronic commerce: consumer trade transactions, the elements of e-commerce – elements, e-visibility, the e-shop, online payment, delivering the goods, after sales service, internet e-com security, a website evolution mode.e-business: Internet book shops, grocery supplier, software supplies and support, electronic newspaper, internet banking, virtual auctions, on-line share-dealing, e-diversity.(6)

Unit IV: (8 Hrs)

Unit V: (8 Hrs)

Unit VI: Recent trends in electronics-commerce, Advanced topics & its Application. (8 Hrs)

Text Books:
1. e-Commerce by David Whiteley (McGrew Hill Pub.)
2. Electronics-Commerce by Gary P. Schneider & James T. Perry.
(COURSE TECHNOLOGY Thomson Learning)

Reference:

Semester VII

REAL TIME OPERATING SYSTEMS
[4-0-0-4] Total Hours: 36 hours
Pre-requisite: Operating System
Co-requisite: NA

Course Objectives
1. To study Real-Time Applications, Commonly Used Approaches and OS services, types and factors RTOS.
2. To study Concept and of Task scheduling, Interrupt Handling
3. To study Comparison and application of various RTOS
4. To introduce new approaches to operating systems design that address the challenges of security, robustness, and concurrency

Course Outcomes
Upon successful completion of the course, students will be able to
   b. Gain knowledge Working and implementation of real time applications.
   c. Study various scheduling algorithms related to real time applications.

Course Syllabus

Unit I (7 Hrs)

Unit II Software Architectures: (7 Hrs)

Unit III (7 Hrs)

Unit IV (8 Hrs)
Threads And Task Communication: Threads, Context Switching overheads, Scalability, Embedding with application code. Task Scheduling, Interrupt handling, Inter task communication issues in Task management- Processes and Threads, Scheduling, Synchronization and communication.

Unit V (8 Hrs)
Execution Time Prediction: Prosperities of Real and ideal clocks, Clock Servers – Lamport’s Logical clocks, Monotonic
Clock service, A software Clock server, Clock Synchronization-
Centralized Synchronization, Distributed Synchronization.

**Unit VI**

**Recent Trends In Rtos:** Real Time Functions and Services, OS Architectures-Real Time UNIX and POSIX, Emerging trends in real time operating systems. Comparison and application of various RTOS. RTOS examples Vx Works. Advance topics on Embedded Issues

**Text**


**References**

1. Real Time Systems : C.M. Krishna & Kang G. Shin
3. Real-time concepts for embedded systems, Qing Li, Caroline Yao
4. Real-time systems: design principles for distributed embedded applications, By Hermann Kopetz

**BITP413 REAL TIME OPERATING SYSTEMS**

**Total Hours:** 20

**Evaluation Scheme : Practical**

**Practical list**

1. Real Time Operating System introduction in detail.
2. Do Installation of RTOS VxWorks 6.8 simulator.
3. Explore the IDE of VxWorks operating system.
4. To explore how to run programs in Wind River workbench.
5. Write a C program to print “Welcome To Real Time OS” in VxWorks workbench.
6. Do installation of debugger.
7. Write a C program to print output for any conditional loop in VxWorks workbench.
8. How to download code in workbench hardware in VxWorks.
10. To implement one application of VxWork.

**HUMAN COMPUTER INTERACTION**

[3-0-0-3] Total Hours: 45 hours

**Pre-requisite:** Software Engineering

**Co-requisite:** NA

**Course Objectives**

1. This course introduces students the concept of Human-Computer Interaction.

2. It is also aimed to skill Interaction design methodologies.
3. This course also introduces how to apply the Human-Computer Interaction concepts to the current interaction designs.

**Course Outcomes**

Upon successful completion of the course, students will be able to

1. Understand fundamental concepts in HCI;
2. Carry out a range of different types of user study and usability study;
3. Produce different types of low-fidelity and mid-fidelity prototypes;
4. Explain the entire design lifecycle, and implement a complete user-centered design process including user studies, prototyping, and evaluation;
5. Critically assess different methods and approaches in HCI; and be able to provide such critique in applied settings;
6. Describe implementation, and justify approach to, user centred design processes for a range of real-world scenarios.

**Course syllabus**

**Unit - I: Introduction** [6 Hrs]
Introduction, A badly designed interactive system, who designs interactive systems, Engineering, What is useful or usable. Making interactive systems feel natural for users. Introduction, Natural computing, Natural computing and user-cent red system design, Six principles of natural computing, Core concepts, Interactive design, Strengths and weaknesses of interactive systems.

**Unit – II: User modeling** [10 Hrs]

**Unit – III: Task analysis** [8Hrs]
Introduction, Task analysis, Whit is task analysis, Purposes of task analysis, Approaches to task analysis, Hierarchical task analysis. Functional Design Why are we doing this? A Historical Perspective, Who Will This System Serve? What Are We Trying To Do? Object-Based Task/Function Models

**Unit – IV: Multiple views Models** [10 Hrs]
: Review of Model-View-Controller, Multiple Views with Differing View Controls Synchronized Selection, Managing Model Persistence Look and Feel: Consistency, Look, Feel.

**Unit – V: Interface Design Tools** [10 Hrs]

**Unit – VI: Recent trends/ advance topic.**
Books:

Reference Books:
3] Interaction Design beyond human-computer interaction
Authors: Preece, Rogers, and Sharp

BEC410 EMBEDDED SYSTEMS [4-0-0-4]
Total Hours: 36

Pre-requisite: Computer Architecture & Organization
Co-requisite: NA

Course Objectives:
1. To give sufficient background for undertaking embedded systems design.
2. To give knowledge of basic microcontroller
3. To understand connections of various peripherals with microcontroller based system
4. To study industrial use of microcontroller
5. Write a C program to print ’Hello Wolrd’ in VxWorks workbench.
6. To study installation of debugger.
7. To study how to download code in workbench hardware.
8. To study one application of VxWork

Course Syllabus
Unit I: (7 Hrs)

Unit II: (7 Hrs)
8051 Instruction Set, Addressing modes & programming. 8051 Timers, Serial I/O

Unit III: (7 Hrs)
Memory Interfacing. Programming, Real time interfacing with LED, LED display, LCD display

Unit IV: (7 Hrs)
RISC Controller : ARM Micro-controllers – overview; features, ARM 7 –architecture, Thumb, Register Model, Addressing modes, Instruction set.

Unit V: (4 Hrs)
Real-time Versus Conventional Software, Software Engineering Issues, Study of Embedded OS-Win CE, RT LINUX

Unit VI: (4 Hrs)
Industrial Interfacing Buses: PCI, ESA, EISA, I2C, USB, RS232. Advanced topics on embedded system

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Experiment various devices and buses used for embedded networking.
2. Design industrial projects
3. Work on real time systems

Text Books:

Reference Books:
3. Data sheet of respective microcontrollers

TCP/IP
Evaluation Scheme: Theory [3-0-1-4]
Total Hrs: 45

Pre-requisite: Computer Networks
Co-requisite: NA

Course Objectives:
1. This course introduces student’s fundamental concepts of Ecommerce.
2. It is aimed at developing skills to consumer e applications and organizational applications of ecommerce.
3. This course provides carrier opportunities as web applications development and application engine design.

Course Outcomes
Upon successful completion of the course, students will be able to
1. Understand the basics of TCP/IP.
2. Identify principal beyond TCP/IP involved in the real time applications.
3. Develop an appropriate mathematical formulation for the networking problems, and analyze them in order to find the most suitable solution.
4. Understand advanced computing techniques and tools in the area of networking and TCP/TP systems, its modeling and analysis.

Course Syllabus
Unit I: (Hrs: 8)
The TCP/IP Architecture, The Internet Protocol: IP Packet, IP Addressing, Subnet Addressing, IP Routing, Classless Inter-Domain Routing (CIDR), Address Resolution, Reverse Address Resolution, Fragmentation and Reassembly, ICMP: Error and
Control Messages. IPv6: header format, Network Addressing, Extension Headers

Unit-II: (Hrs: 7)

Unit-III: (Hrs: 7)

Unit-IV: (Hrs: 7)

Unit-V: (Hrs: 8)

Unit-VI: (Hrs: 8)
Recent trends in TCP/IP for wireless network, advanced topics & its Application

Books:
2. An Engineering approach to computer networking, S. Keshav, Addison Wesley, 2001

Reference Books:
3. TCP/IP Illustrated Volume 1: The protocols,1/e-99, W. Richard Stevens, Pearson education


TLP/IP
Total Hours: 30 hours
Evaluation Scheme: Practical

Practical List:-
- Configuring Internet IP address
- Assigning IP address using CIDR
- Creating an echo-client-server
- Building client for TIME protocol
- Configuring APACHE server
- Capture and decode Ethernet frame
- Decode header fields of TCP header
- Designing an internet server with web hosting facility
- To build concurrent sever in Linux
- To implement TCP/IP socket communication.
- To configure a DNS Server.
- TCP/IP socket communication in Java
- Open Ended Practical.

.EMBEDDED SYSTEMS
[4-0-0-4] Total Hours: 36
Pre-requisite: Computer Architecture & Organization
Co-requisite: NA

Course Objectives:
- To give sufficient background for undertaking embedded systems design.
- To give knowledge of basic microcontroller
- To understand connections of various peripherals with microcontroller based system
- To study industrial use of microcontroller
- To write a C program to print ‘Hello World’ in VxWorks workbench.
- To study installation of debugger.
- To study how to download code in workbench hardware.
- To study one application of VxWork
Course Outcomes:
Upon successful completion of the course, students will be able to
1. Experiment various devices and buses used for embedded networking.
2. Design industrial projects
3. Work on real time systems

Course Syllabus
Unit I: (7 Hrs)

Unit II: (7 Hrs)
8051 Instruction Set, Addressing modes & programming. 8051 Timers, Serial I/O

Unit III: (7 Hrs)
Memory Interfacing. Programming, Real time interfacing with LED, LED display, LCD display

Unit IV: (7 Hrs)
RISC Controller : ARM Micro-controllers – overview; features, ARM 7 –architecture, Thumb, Register Model, Addressing modes, Instruction set.

Unit V: (4 Hrs)
Real-time Versus Conventional Software, Software Engineering issues, Study of Embedded OS-Win CE, RTLINUX

Unit VI: (4 Hrs)
Industrial Interfacing Buses: PCI, ESA, EISA, I2C, USB, RS232. Advanced topics on embedded system

Text Books:

Reference Books:
3. Data sheet of respective microcontrollers

BECP410 EMBEDDED SYSTEMS (0-0-2-1)
Total Hrs: 30

List of Practicals:
1. Use of Microcontroller tools for programming (Keil).
2. Write a program to perform arithmetic Operation using 8051 Microcontroller.
3. Write a program to perform addition of two arrays using 8051 Microcontroller
4. Write a program to perform Array Sorting
5. Write a program to perform Interrupt Operation
6. Write a program to interface with LED Display
7. Write a program to interface ADC with 8051 microcontroller.
8. Write a program to perform serial communication using 8051 microcontroller.
9. Write a program to perform arithmetic Operation using ARM7 Microcontroller
10. Write a program to perform addition of two arrays using ARM7 Microcontroller
11. Write a program to generate square wave using 8051 microcontroller
12. Open Ended Mini Project
   1. Write a program to interface stepper motor to 8051 microcontroller and to rotate stepper motor in a clockwise and anti clockwise direction.

BITP401 Project Phase I Seminar
Evaluation Scheme: Practical [4P]

EIGHTH SEMESTER

BITP402 Industrial Project Phase II
Evaluation Scheme: Practical [16P]
Six Months

Course Outcome
Upon successful completion of the course, students will be able to
1. Students develop some modulus of applications based on databases, networking, internet, web based.
2. They also develop some modulus for online implementation.

NATURAL LANGUAGE PROCESSING ELECTIVE – III
[4-0-0-4] Total
Hrs: 45
Pre-requisite: Language Processor
Co-requisite: NA

Course Objectives:
1. This course introduces student the basics and concepts in natural language processing making them aware of the statistical and empirical methods in solving problems involving natural (human) language.
2. It is aimed at developing skills to work with text, speech, and other language data.
3. This course also aims to develop skill to build real tools to learn technique beyond NLP. This course provides carrier opportunities in NLP and NLP research.

Course Outcomes
Upon successful completion of the course, students will be able to
1. Understand the basic concept of natural language processing.
2. Understand and implement probabilistic models in code, estimate parameters for such models, and run meaningful experiments to validate such models.
3. Understand the statistical and empirical methods in solving problems involving Natural Language
4. Implement a system which processes natural language.

Course Syllabus
Unit I: Introduction (8 Hrs)
NLP tasks in syntax, semantics, and pragmatics. Applications such as information extraction, question answering, and machine translation. The problem of ambiguity. The role of machine learning. Brief history of the field.

Unit II: N-gram Language Models (8 Hrs)

Unit III: Speech Tagging And Sequence Labeling (9 Hrs)

Unit IV: Syntactic Parsing (8 Hrs)
Grammar formalisms and treebanks. Efficient parsing for context-free grammars (CFGs). Statistical parsing and probabilistic CFGs (PCFGs). Lexicalized PCFGs.

Unit V: Semantic Analysis (9 Hrs)

Unit VI: Applications Of NLP (3 Hrs)
Recent trends in Natural Language Processing, Advanced topics & its Application

Book:
1. SPEECH and LANGUAGE PROCESSING, an Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition, Second Edition by Daniel Jurafsky and James H. Martin

ADVANCED WEB TECHNOLOGIES ELECTIVE – III
[4-0-0-4]
Total Hrs: 45
Pre-requisite: Introduction to Internet Programming
Co-requisite: NA

Course Objectives
1. This will help student to learn about developing of web based applications using CGI programming language, Perl, PHP, Dream weaver, J2ME.

Course Outcomes
Upon successful completion of the course, students will be able to
1. Understand the basics of web based application development.
2. Identify the exact method for development of real life web base applications.
3. Develop a code for web application and analyze them, with proper selection of language.
4. Understand advanced language and tools in the area of web base application, system modeling and analysis.
**Text Books:**
2. *Beginning PHP 5 and MySQL*. W. Jason Gilmore

**Reference Books:**
1. CGI programming in C & Perl by Thomas Boutell (Addison-Wesley Publication).

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**DISTRIBUTED DATA BASES AND OBJECT ORIENTED DATA BASES ELECTIVE – III**

**Theory** [4-0-0-4]

**Total Hrs:** 45

**Pre-requisite:** Database management System

**Co-requisite:** NA

**Course Objectives**
1. This course introduces students to the fundamental concepts of distributed and object-oriented databases making them aware of techniques of designing and managing data in distributed environments.
2. It is also aimed at developing skills to provide solutions to real-life applications which involve distributed databases.
3. This course provides career opportunities in subject areas of design and management and analysis.

**Course Outcomes**
Upon successful completion of the course, students will be able to:
1. Understand the basics of distributed and object-oriented databases.
2. Identify methods and techniques to design the distributed and object-oriented databases.
3. Develop an appropriate mathematical formulation for optimization techniques in manipulation and handling of data in distributed environments.
4. Understand advanced techniques and tools in the area of distributed and object-oriented databases.

**Course Syllabus**

**Unit I:** (7 Hrs)
Distributed databases - features, distributed database management system - review of databases and computer networks, levels of distribution transparency. Reference architecture, type of data fragmentation, distribution transparency for read-only applications and update applications. Distributed database access primitives and integrity constraints.

**Unit II:** (7 Hrs)
Distributed database design, a framework for distributed database design, the design of database fragmentation, the allocation of fragments, translation global queries to fragment queries, equivalent transformation for queries, transforming global queries into fragment queries. Distributed grouping and aggregate function evaluation, parametric queries.

**Unit III:** (8 Hrs)
Query optimization, problems in query optimization, objectives in query process optimization, simpler representation of queries, model for query optimization, query rewriting, general queries, concept of two phase commit, resolving distributed transactions. Concept of replication, snapshot on replication and multimaster replication, conflict resolution in MultiMate replication, concurrency control and database recovery in distributed databases.

**Unit IV:** (8 Hrs)
The evolution of object-oriented concepts. Object-oriented concepts, characteristics of an object-oriented data model, object schemas, class-subclass relationships, inter-object relationships, late and early binding, and support for versioning. Similarities & differences between OODM and other data models, features of an object-oriented databases management system, OODBMS architectural approaches, extended relational model approach, semantic database approach, object-oriented database programming language, extension approach, DBMS generator approach, object definition language and object query language.

**Unit V:** (10 Hrs)
OODBMS architectures, performance issues in OODBMS, application selection for OODBMS, database design for an object relational database management system (ORDBMS), structured types & ADTs, object identity, extending ER model. Using nested collections, storage and access methods, query processing, query optimization, design and architecture of POSTGRES, distributed computing in CORBA and BiB.

**Unit VI:** (5 Hrs)
Recent trends/advance topic.

**Books:**
1. *Distributed data bases principles and systems* by Ceri & Pelagatti (McGraw Hill Publ.)

**Reference Books:**
4. *Database System - Design Jinpcinetation & Management* by Peter Rob & Carlos Coronel. (Course Tech.)
WIRELESS COMMUNICATION ELECTIVE – III [4-0-0-4]
Total Hrs: 45

Pre-requisite: Computer Networks
Co-requisite: NA

Course Objectives
1. This course introduces students the basic and operational principles of the various components of wireless networks while making them aware of how the connections are setup and maintained.
2. It also skill the students with the regulatory environment in which the Wireless industry operates;
3. The course also provides the carrier opportunities in the field of wireless network.

Course Outcomes
Upon successful completion of the course, students will be able to
1. Understand the basic and operational concept of computer network fundamental.
2. Understand different modulation schemes and multiple access techniques used in wireless communications.

Course Syllabus
Unit I: (7 Hrs)
Introduction to wireless telecommunication systems and Networks, History and Evolution Different generations of wireless cellular networks 1G, 2g,3G and 4G networks.

Unit II: (7 Hrs)
Common Cellular System components, Common cellular network components, Hardware and software, views of cellular networks, 3G cellular systems components, Cellular component identification Call establishment.

Unit III: (7 Hrs)
Wireless network architecture and operation, Cellular concept Cell fundamentals, Capacity expansion techniques, Cellular backbone networks, Mobility management, Radio resources and power management Wireless network security.

Unit IV: (8 Hrs)
GSM and TDMA techniques, GSM system overview, GSM Network and system Architecture, GSM channel concepts, GSM identifiers. GSM system operation, Traffic cases, Cal handoff, Roaming, GSM protocol architecture. TDMA system , GSM system operation, Traffic cases, Cal handoff, Roaming, GSM protocol architecture.

Unit V: (8 Hrs)
TDMA systems Wireless Modulation techniques and Hardware, Characteristics of air interface, Path loss models, wireless coding techniques, Digital modulation techniques, OFDM, UWB radio techniques, Diversity techniques, Typical GSM Hardware. Introduction to wireless LAN 802.11X technologies, Evolution of Wireless LAN Introduction to 802.20X technologies in PAN.

Unit VI: (8 Hrs)
Application and architecture Bluetooth Introduction to Broadband wireless MAN, 802.16X technologies, emerging trends in wireless communication.

Books:

Reference Books::

INDUSTRIAL ROBOTICS ELECTIVE – III [4-0-0-4]
Total Hrs: 45

Course Objectives:
1. To understand robot anatomy.
2. To study basic control system models.
3. To learn actuation and feedback components.
4. To study sensors and grippers.
5. To learn the applications in material handling, machining, welding, assembly, etc.
6. To study robot cell layouts.

Course Outcomes:
After successfully completing the course, students will be able to
1. Understand the importance and application of robotics in industry.
2. Apply knowledge and demonstrate the skill acquired for operation of industrial robots.
3. Develop capability of drawing and understanding specifications of Robots.
4. Evaluate alternatives and select robot for particular application.

Course Syllabus
Unit I (7 Hrs)
Automation and Robotics, Robot anatomy, configuration of robots, joint notation schemes, work volume, introduction to manipulator kinematics, position representation, forward and reverse transformations of a 2- DOF arm, a 3- DOF arm in two dimension , a 4 – DOF arm in three dimension, homogeneous transformations in robot kinematics, D-H notations, solving kinematics equations, introduction to robot arm dynamics.

Unit II (7 Hrs)
Basic control system models, slew motion, joint –interpolated motion and straight line motion, controllers like on/off, proportional, integral, proportional plus integral, proportional plus derivative, proportional plus integral plus derivative.

Unit III (8Hrs)
Robot actuation and feedback components position and velocity sensors, actuators and power transmission devices,
mechanical grippers, vacuum cups, magnetic grippers, pneumatic, electric, hydraulic and mechanical methods of power and control signals to end effectors.

Unit IV (8 Hrs)
General considerations in robot material handling, material transfer applications, pick and place operations, palletizing and related operations, machine loading and unloading, die casting, plastic molding, forging, machining operations, stamping press operations using robots.

Unit V (7 Hrs)
Application of robot in spot welding continuous arc welding, spray coatings, Robots in Assembly Operations.

Unit VI (8 Hrs)
Robot cell layouts, multiple robots and machine interface, other considerations in work cell design, work cell control, interlocks, error detection and recovery, work cell controller, robot cycle time analysis.

Text Book:

Reference S Books:

PATTERN RECOGNITION ELECTIVE – IV [4-0-0-4]
Total Hrs: 45

Pre-requisite: NA
Co-requisite: NA

Course Objectives
1. This course introduces the fundamentals of Pattern recognition.
2. The students skilled to choose an Appropriate feature and pattern classification algorithm for a pattern recognition problem,
3. The course also skill the students to properly implement the algorithm using modern computing tools such as Matlab, Open CV, C, C++ and correctly.

Course Syllabus

Unit I: (7 Hrs)
Statistical Decision Theory, Probability-probabilities of events, random variables, joint distribution & densities, moments of random variables, estimation of parameters from samples, minimum risk estimators.

Unit II: (7 Hrs)
Statistical Decision Making—Bayes theorem, multiple features, conditionally independent features, decision boundaries, unequal cast of error, estimation of error rates, the leaving-one-out technique characteristics curve, estimating the composition of population.

Unit III: (7 Hrs)
Non parametric decision Making—Histograms, kernel and window estimators, nearest neighbor classification techniques, adaptive decision boundaries, adaptive discriminate functions, minimum squared error estimation functions, choosing a decision making technique.

Unit IV: (8 Hrs)
Clustering—Introduction, hierarchical clustering, partitioned clustering.

Unit V: (8 Hrs)
Processing of waveforms and images—Gray level scaling transformations, equalization geometric image scaling and interpolation, smoothing transformation, edge detection, line detection and template matching, logarithmic gray level scaling, statistical significance of image features.

Unit VI: (8 Hrs)
Recent trends/advance topic.

Course Outcomes
Upon successful completion of the course, students will be able to

1. Understand the nature and inherent difficulties of the pattern recognition problems.
2. Understand concepts, trade-offs, and appropriateness of the different feature types and classification techniques such as Bayesian, maximum-likelihood.
3. Identify and Select a suitable classification process, features, and proper classifier to address a desired pattern recognition problem.
4. Implement algorithm using available resources and to properly interpret and communicate the results clearly and concisely using pattern recognition terminology classification, Clustering

Book
1. Pattern recognition and image processing by Earl Gose, Richard Johnsonbaugh & Steve Jost (PHI Pub.)

BIO-INFORMATICS ELECTIVE – IV [4-0-0-4]
Total Hrs: 45
Pre-requisite: NA
Co-requisite: NA  

Course Objectives

1. Student will be able to develop new algorithms and statistics to assess relationships among members of large data sets.
2. Analyses and interprets various types of data including protein structures;
3. Its implementation to enable efficient access and management of different types of information

Course Outcomes

Upon successful completion of the course, students will be able to

1. Understand the basics of bio-informatics.
2. Understand & study different techniques to access and analysis large data set.
3. Develop an appropriate approach to bio-informatics in real life application.

Course Syllabus

Unit I: (7 Hrs)  
What is Bio informatics and why study it? Basic concepts, Protein and amino acid, DNA and RNA, sequence, structure and functions.

Unit II: (7 Hrs)  
Bioinformatics database: Introductions, type of database, Nucleotide sequence database: Primary Nucleotide sequence database:

Unit III: (7 Hrs)  
EMBL, Genebank, DDBJ and Secondary Nucleotide sequence database: UniGene, SGD, EMI Genomes, and Genome Biology.

Unit IV: (8 Hrs)  
Protein sequence database: Swiss port, Tremble, PIR, sequence motif database; Protein data bank, SCOP, CATH.

Unit V: (8 Hrs)  
Sequence Alignment and Database searching: Single sequence alignment and multiple sequence alignment. Protein –Protein Interaction: Yest two-hybrid assay, High-throughput mass spectrometry, Interaction network and system biology.

Unit VI: (8 Hrs)  
Recent trends/ advance topic.

BOOKS:
2. J.F. Griffiths, “An Introduction to Generic Analysis”

REFERENCE BOOKS:

SOFTWARE TESTING ELECTIVE – IV: [4-0-0-4]  
Total Hrs: 45

Pre-requisite: Software Engineering  
Co-requisite: NA

Course Objectives

1. This course introduces basics of software testing at the function, class and application level. His course is also aimed to develop concepts of black-box (functional and boundary) and white-box (coverage-based) testing, and apply these concepts to small programs and components (functions and classes).
2. This course introduces the software engineering discipline of software quality engineering and to understand the essential characteristics of tools used for test automation
3. The legal and societal issues of software quality.
4. This course also provides the career opportunities in the field of software testing

Course Outcomes

Upon successful completion of the course, students will be able to

1. Understand the distinctions between validation testing and defect testing.
2. Understand the principles of system and component testing.
3. Understand the strategies for generating system test cases.
4. Understand the essential characteristics of tools used for test automation.
5. Identify Software Quality and Assurance practices and various software testing techniques through case studies.

Course Syllabus

Unit I: (7 Hrs)  

Unit II: (7 Hrs)  

Unit III: (7 Hrs)  

Unit IV: (8 Hrs)

Unit V: (8 Hrs)
People and organizational issues: Common people issues and myths in testing, providing career paths in testing, Organizational structures for testing teams, geographically distributed testing teams and success factors. Test Metrics Product Metrics, Process Metrics, Progress Metrics, and Use of metrics in ascertaining product release.

Unit VI: (8 Hrs)
Recent trends/advance topic.

Books:

Reference Books:

ENTERPRISE RESOURCE PLANNING ELECTIVE – IV [4-0-0-4]
Total Hrs: 45

Pre-requisite: NA
Co-requisite: NA

Course Objectives
1. The course introduces student the general idea of enterprise resource planning making them aware of analyze the factors and forces which facilitate ERP systems.
2. It is also aimed at developing skills to implement ERP systems.
3. This course provides carrier opportunities in subject areas of design of ERP system used for decision making process.

Course Outcomes
Upon successful completion of the course, students will be able to
1. Understand the basics of ERP systems.
2. Identify factors and forces which facilitate development of ERP systems.
3. Identify how organizational factors such as managements role and organizational culture contribute to successful ERP.
4. Understand advanced technique and tools for ERP system implementation.

Course Syllabus

Unit I: (7 Hrs)
Introduction business needs and ERP, ERP as an overview, benefits of erp, erp and related technologies, erp architecture, business process reengineering, data warehousing, data mining, on line analytical processing supply choice management.

Unit II: (7 Hrs)
ERP implementation: client server architecture and erp, erp implementation life cycle, implementation methodologies, Implementation - the hidden cost, organizing implementations, vendors, consultants and users, contracts with vendors, consultants and employees, project management and monitoring. After erp implementation.

Unit III: (7 Hrs)

Unit IV: (8 Hrs)
Selection of ERP, SWOT analysis of various ERP products supply chain enabled ERP.

Unit V: (8 Hrs)
ERP and Electronic Data Interchange (EDI) integration, ERP in manufacturing and non manufacturing industries.

Unit VI: (8 Hrs)
Recent trends/advance topic.

Books:
1. ERP Demystified by Aleris Leon (TMH Pub.)
2. Enterprise Resource Planning by Parag Diwan and Sunil Sharma (Pentageon Pren.)

ADVANCED OPERATING SYSTEM DESIGN ELECTIVE – IV [4-0-0-4]
Total Hrs: 45

Pre-requisite: Operating System
Co-requisite: NA

Course Objective:
1. The course is study and understand the main concepts of advanced operating systems ( distributed systems, real time systems, network operating Systems, and open source operating systems)
2. The course is study and understand Hardware and software features that support these Systems.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Understand operating systems facilities essential to the implementation of real-time, reactive, and embedded systems.
2. Understand the limitations of industry-standard operating systems, and introduces new approaches to operating systems design that address the challenges of security, robustness, and concurrency.
3. Understands the practical engineering issues caused by the design of real-time and concurrent systems; and to suggest appropriate implementation techniques for such systems.

Course Syllabus

Unit-I Introduction Distributed Operating System (07 Hrs)
Evolution of Distributed Computing Systems, Theory and implementation aspects of distributed operating system, Limitations of Distributed Systems, Issues in designing a Distributed Operating System.

Unit-II Message Passing Model (08 Hrs)
IPC and RPC Message Passing Model, Blocking, non-Blocking, Buffering, Un-Buffering, Synchronous, Asynchronous options.

Unit-III Clock Synchronization (08 Hrs)
Physical and Logical Clocks, Lamport’s Logical Clock, Vector Clocks, Casual Ordering of Messages, Global State.

Unit -IV Process Synchronization (12 Hrs)

Unit -V Distributed Shared Memory (08 Hrs)
Architecture & Motivation, Approaches for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues, and Case Studies

Unit VI: Recent trends/ advance topic. (2 Hrs)

Book:

Text Books:
2. Distributed Operating Systems, Andrew S. Tanenbaum

References:
3. Distributed Systems: Principles and Paradigms, Andrew S. Tanenbaum & Maarten van Steen

Semester VIII

Industrial Project Phase II
Evaluation Scheme: Practical [0-16-0-16] [16P] Six Months

Course Outcome
Upon successful completion of the course, students will be able to
1. Students develop some modulus of applications based on databases, networking, internet, web based.
2. They also develop some modulus for online implementation.

BITP412: Self Study [1C]