AUTONOMOUS SCHEME

Scheme and Syllabi of
(I & II Semesters)
2015-2016

B.E. Programme for
Civil and Mechanical streams

SRI JAYACHAMARAJENDRA
COLLEGE OF ENGINEERING
Mysuru -570 006
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<th>Sl. No.</th>
<th>Subject Code</th>
<th>Teaching department</th>
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Course Objectives
1. To equip the student with the mathematical tools, from calculus and differential equations, necessary to understand topics covered in the engineering disciplines.
2. Students should be able to identify situations in their chosen branches of Engineering which they could model as simple ODEs and interpret the solution.

Course Outcomes
CO-1 Use partial derivatives to calculate rate of change of multivariate functions.
CO-2 Discuss the nature of polar curve and use these concepts to find different parameters.
CO-3 Understand the concepts of limits, sequences, series, convergence, divergence and region of convergence and apply these in engineering problems.
CO-4 Apply the concepts of functions of several variables.
CO-5 Apply differential calculus to determine the Voltage-response characteristic of an inductive circuits.
CO-6 Recognize and solve first-order ordinary differential equations, Newton's law of cooling.
CO-7 Will be able to analyze and interpret data.

Syllabus
1. Curve tracing and tracing of standard curves; Polar curves, angle between the radius vector and tangent at a point, pedal equation; mean value theorems, Polynomial approximation and Taylor's theorem; Indeterminate forms.
2. Partial differentiation: homogeneous functions, implicit functions, Jacobians, Taylor's theorem in two variables, error estimation; Applications of Partial differentiation, maxima and minima of functions of several variables, Lagrange multipliers.
3. Infinite sequences and series, convergence and divergence, standard examples.
4. Integral calculus: Reduction formulae; beta and gamma functions
5. Differential equations: Solutions of first order ODEs; orthogonal trajectories (cartesian / polar curves).

Text Books:
1. Advanced Engineering Mathematics, Erwin Kreizyg

References:
ENGINEERING PHYSICS
I Semester B.E. (Civil and Mechanical stream)

Sub. Code : PH110/PH210 Contact Hrs.: 4/Week
Credits : 4-0-0 Total Hrs.: 52

Course Objectives
After completing the course, the student should be able to:
1. Imbibe the basic concepts of Physics in a correct perspective.
2. Understand the blending of physics principles in recent technology through the basic point of view so that it can be exploited in development of technology.
3. Equip with right type of knowledge in Nanotechnology & Material science and their applications.
4. Analyze the relationship between nano/microstructure, characterization, properties and design of materials.
5. Adapt in advanced studies leading to research in engineering and physical sciences.

Course Outcomes
The student will be able to:
CO-1 Analyze the basic concepts of Modern Physics, principles of Quantum Mechanics and the relevance of special theory of relativity in Modern Physics and Quantum Mechanics.
CO-2 Explain the Electrical conductivity & Superconducting properties of materials and their suitability for Engineering application.
CO-3 Discuss the Principles of Laser & its application in Optical Fiber Communications.
CO-4 Identify the importance of structural studies in materials and compare/classify the different materials based on its crystal structures.
CO-5 Compare the different methods of preparation of Nanomaterials such as CNT's & its properties and applications.

Syllabus
UNIT-I
Modern Physics & Quantum Mechanics:
Introduction to blackbody radiation spectrum, Wave-Particle dualism, de-Broglie hypothesis - de Broglie wavelength - extension to electron particle, Davison and Germer Experiment, Matter waves and their characteristic properties. Phase velocity, group velocity and Particle velocity, Relation between phase velocity and group velocity, Relation between group velocity and particle velocity, Expression for de-Broglie wavelength using group velocity.

Heisenberg's uncertainty principle and its physical significance, Application of uncertainty principle - Non-existence of electron in the nucleus, Wave function- Properties, Physical significance (Probability Density), and Normalization. Setting up of one dimensional time independent Schrödinger wave equation, Eigen values and Eigen functions, Application of Schrödinger wave equation - Eigen values for a particle in one dimensional potential well of infinite depth and for free particle.

UNIT-II
Electrical Conductivity in Metals & Superconductivity
Classical theory: Free-electron concept, Drude- Lorentz theory & Assumptions, Drift velocity & its Expression, Mean collision time, Mean free path & Relaxation time, Expression for electrical conductivity / resistivity in metals, Failures of classical free-electron theory.
Temperature dependence of resistivity in superconducting materials, BCS theory (qualitative), Effect of Magnetic field (Meissner effect), Temperature dependence of Critical field, Type-I and Type-II superconductors, High temperature superconductors, Applications - Superconducting magnets, Maglev vehicles.

UNIT-III
Lasers & Optical Fibers

UNIT-IV
Crystal Physics
Space lattice, Bravais lattice, Lattice parameters, Unit cell & Primitive cell, Different Crystal systems, Direction and planes in a crystal, Miller indices, Expression for inter-planar spacing, Co-ordination number, Atomic packing factor, Crystal structures of NaCl and Diamond. Bragg's Law of X-ray diffraction, Crystal structure determination by Bragg's X-ray spectrometer.

UNIT-V
Special Theory of Relativity & Nanotechnology
Frames of References, Basic Postulates of theory of relativity, Lorentz transformation equations (no derivation), Invariance of Lorentz transformations, Lorentz -Fitzgerald's length contraction, Einstein's time dilation, Addition of velocities, Variation of mass with velocity, Mass energy equivalence E = mc², Relation between total energy, rest mass energy and momentum.

References:
ENGINEERING MECHANICS
I Semester B.E. (Civil and Mechanical stream)

Sub. Code : CV110 Contact Hrs.: 4/Week
Credits : 4-0-0 Total Hrs.: 52

Course Objective
1. To analyse problems in engineering subjected to a force system to compute the net effect
2. To analyses the equilibrium of rigid bodies.
3. To determine the geometric properties of plane sections.

Course Outcomes
The student has the
CO-1 Ability to analyze the given force system to compute its resultant.
CO-2 Ability to determine the reactions at the supports of statically determinate systems.
CO-3 Ability to analyze the system of forces in equilibrium with or without frictional forces.
CO-4 Ability to locate the centroid of plane figures and to compute the second moment of areas of standard sections.

Syllabus
1. Introduction to Engineering mechanics: Basic idealizations - Particle, Continuum, Rigid body and Point force; Newton's laws of motion, Definition of Force, Introduction to SI units, Elements of a force, Classification of force and force systems; Principle of physical independence of forces, Principle of superposition of forces, Principle of transmissibility of forces; Moment of a force, couple, moment of a couple, characteristics of a couple, Equivalent force - couple system; Resolution of a force, Composition of forces; Numerical problems on moment of forces and couples and on equivalent force - couple system.
2. Composition of forces - Definition of Resultant; Composition of coplanar - concurrent force system, Principle of resolved parts; Numerical problems on composition of coplanar-concurrent force systems.
3. Composition of coplanar - non-concurrent force system, Varignon's principle of moments; Numerical problems on composition of coplanar non-concurrent force systems.
4. Centroid of plane figures and simple built up sections; Numerical problems.
5. Moment of inertia of an area, polar moment of inertia, Radius of gyration, Perpendicular axis theorem and Parallel axis theorem; Moment of inertia of composite areas; Numerical problems.
6. Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami's theorem; Numerical problems on equilibrium of coplanar - concurrent force system.
7. Types of supports, statically determinate beams, Numerical problems on equilibrium of coplanar - non-concurrent force system and support reactions for statically determinate beams; numerical problems.

Text Books:

References:
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
I Semester B.E. (Civil and Mechanical stream)

Sub. Code : EE110  Contact Hrs.: 4/Week
Credits : 4-0-0  Total Hrs.: 52

Course Objective
The emphasis in this course is on teaching relevant electrical and electronics engineering concepts to engineers who will be users, not designers, of electrical, electromagnetic and electronic systems. Typically these engineers would specialize in branches other than electrical and electronics. The course should help the students to:
1. Understand the function of components and equipment.
2. Acquire the skills to properly utilize the aids that modern electrical technology can offer.
3. Facilitating active cooperation with specialists in electrical engineering.
4. Providing a basis for further studies in this area.

Course Outcomes
After completing this course, the student should be able to
CO-1 Analyze a resistive network excited by D.C. or a network excited by single-phase or three-phase A.C. source/s and compute voltage/s, current/s, and power in them, describe how electric energy is generated, transmitted, and distributed, describe the power sector organization structure in India.

CO-2 Describe the working principle and applications of transformers, induction motors and stepper motors. Solve simple problems on them.

CO-3 Describe concealed wiring employed in domestic installations, explain the working and applications of GLS, TL, and CFL lamps, explain safety aspects to be kept in mind in respect of electrical installations.

CO-4 Explain the working and applications of the following basic components of electronic systems; diode, BJT, SCR, MOSFET, IGBT, basic logic gates, flip-flops, memories, counters and registers, opamps, ADC and DAC.

CO-5 Explain the working of a regulated power supply.

Syllabus
Note: Where ever necessary, exposure to real-time systems/lab may be included.

1. Elementary Circuit and Network Theory

2. Electric Power Systems and Machinery
Mention of conventional and non-conventional energy sources. Block diagrams of thermal and hydel power plants. General structure of electrical power systems. Power transmission and distribution via overhead lines and underground cables. Power sector organization structure in India.

of operation, ratings and characteristics, starters, applications. Introduction to single-phase induction motors. Stepper motors: construction, working principle, ratings and applications.

3. Domestic Wiring, Lighting, and Electrical Safety

4. Elements of Electronics Engineering
Introduction to diode, BJT, SCR, IGBT, MOSFET and their applications. Basic logic gates, combinatorial circuits, flip flops, memory, counters and registers. ADC and DAC. Opamps as adder, subtractor, integrator and differentiator. Regulated power supply.

Text Books:
3. Malvino, "Digital Electronics and Microprocessors", TMH.
4. Lecture Notes.

MECHANICAL ENGINEERING SCIENCE
I Semester B.E. (Civil and Mechanical stream)
Sub. Code : ME120/ ME220 Contact Hrs.: 4/Week
Credits : 4-0-0 Total Hrs.: 52

Course Objectives
1. To explain the role of Mechanical Engineering and its integration to other fields of Engineering.
2. To explain importance of different forms of energy, its classification including conventional and non conventional energy resources and their transformation.
3. To explain with neat sketches, construction and working principles of Mechanical Systems/ contrivances like Prime Movers, Refrigeration and Air Conditioning units, power transmitting systems and metal joining methods.
4. To describe with neat sketches, Manufacturing Processes like casting, Metal Cutting and use of various machine tools.
5. To know the choice of engineering materials that are available for the Engineer and identify the processes used to transform them in to products.

Course Outcomes
CO-1 The student must be able to define energy sources, and explain how they could be harnessed for human benefit.
CO-2 Must be capable of identifying and selecting prime movers and other power transmission devices to be able to illustrate their importance.
CO-3 Must be capable of selecting the right material for the right application and choose the right process to convert the material into products.
CO-4 Must demonstrate the ability to identify the right choice of cooling system.
Syllabus

UNIT - I
Energy and Steam
Sources and Classification of energy resources. Brief description of Solar energy, Wind energy, Tidal energy and Nuclear energy. Steam formation. Types of steam. Steam properties - Specific Volume, Enthalpy and Internal energy. (No numerical problems), Boilers, Classification, construction and working of Lancashire boiler and Babcock and Wilcoxon boiler. Boiler mountings and accessories

UNIT - II
Turbines
Steam turbines - Classification, Principle of operation of Impulse and reaction. Compounding of Impulse turbines. Gas turbines - Classification, Working principles and Operations of Open cycle and Closed cycle gas turbines. Water turbines - Classification, Principles and operations of Impulse and reaction

UNIT - III
Internal Combustion Engines
Classification, I.C. Engines parts, Two and Four Stroke Petrol and diesel engines. P-V diagrams of Otto and Diesel cycles. Simple problems on indicated power, Brake power, Indicated thermal efficiency, Brake thermal efficiency, Mechanical efficiency and specific fuel consumption.

UNIT - IV
Power Transmission
Belt Drives - Classification and applications. Definitions - Velocity ratio, Creep and slip, Idler pulley, stepped cone pulley and fast & loose pulley. Gears - Definitions, Terminology, Types and uses. Gear drives and Gear Trains simple and compound gear trains. (No numerical problems)

UNIT - V
Lubrication and Bearings
Lubricants - classification and properties. Lubricators - types of lubricators Wick, drop feed and splash lubricators. Classification of bearings. Pedestal bearing, Ball and roller bearings

UNIT - VI
Refrigeration and Air conditioning

UNIT - VII
Joining Processes

UNIT - VIII
Lathe and Drilling Machines
Knurling, Thread Cutting, Drilling, Taper turning by Tailstock offset method and Compound rest swiveling method.


UNIT IX
Materials for manufacturing
Classification of different types of materials suitable for manufacturing, ferrous & non-ferrous metals and their alloys. Non-metallic materials like plastics, elastomers, ceramics and composites, material selection
Manufacturing processes: Pattern and pattern materials. Types of patterns and moulding sands. Moulding processes - Green sand mould and Shell moulding preparation. Die casting - Hot and cold chamber die casting

Text Books:

References:
1. Elements of Mechanical engg., - Hajra chowdhry & others, Media promoters 2010

ENGINEERING PHYSICS LAB
I Semester B.E. (Civil and Mechanical stream)
Sub. Code : PH12L/PH22L Contact Hrs.: 3/Week
Credits : 0-0-1.5 Total Hours : 39

Course Objective
After completing the course, the student should be able to:
1. Understand the significance of Physical constants & calculate the physical constants and errors involved in the measurements.
2. Use the measuring instruments like screw gauge, slide calipers, travelling microscope and spectrometer.
3. Identify the electrical/electronic components / devices & build AC/DC circuits & know their uses as voltage regulators & charge storing devices.
4. Analyze the physics principles behind the electrical properties and elastic properties of solid materials.
5. Understand the concept of optical phenomenon such as diffraction & interference.

Course Outcomes
The student will be able to:
CO-1 Determine the Elastic modulus of the solid material.
CO-2 Study the I-V characteristics of diode, Calculation of Planck's constant using LED, Calculate the energy gap of semiconductor diode.
CO-3 Understand the principles of diffraction and interference by diffraction grating and Newton's rings experiments.
CO-4 Study the Dielectric constant of material, and Fermi energy of metals.
CO-5 Study the resonance in LCR circuits and its applications as acceptor and rejector circuits.

List of Experiments
1. Series and Parallel LCR AC Circuits- Determination of
resonant frequency and Inductance.
4. Ultrasonic Interferometer- Calculation of velocity of sound in liquids.
5. Charging & Discharging of Capacitor- Determination of dielectric Constant of dielectric medium in capacitor.
6. Diffraction Grating- Determination of wavelength of Laser/ Hg source using diffraction grating.
7. Planck's Constant- Calculation of Planck's constant using I-V characteristic study of LED.
8. Stefan's Law- Verification of Stefan's law of black body experimentally.
10. Uniform Bending- Determination of Young's modulus of elastic bodies (Hooke's Law).
12. Helmholtz Resonator- Calculation of unknown frequency of tuning fork.
15. Four probe experiment- Calculation of resistivity of semiconductor materials by four probe method.

BASIC WORKSHOP PRACTICE
I Semester B.E. (Civil and Mechanical stream)
Sub. Code : ME12L Contact Hrs.: 3/Week
Credits : 0-0-1.5 Total Hrs.: 39

Course Objective
1. To know the need for gaining knowledge in fitting and metal joining practices.
2. To understand these practices' are required for improving the basic attributes of an engineer like set of skills, point of view and body of knowledge.
3. To formulate and prepare the drawing for fitting and metal joining processes.
4. Outline the procedure for the preparation of jobs in fitting and metal joining practices including safety precautions to be adopted.
5. To implement various equipments and appropriate instruments in preparation of the jobs according to drawings prepared.

Course Outcomes
CO-1 Students will be able to posses the basic attributes of engineers such as psychomotor skills including perception, guided response, adaptation and origination.
CO-2 Student will be able to appreciate basic safety precautions and appropriate use of instruments for particular applications adopted in a generalized industrial situation.

Syllabus
1. Fitting Practice-Cutting, Filing, Fitting & Finishing Safety Precautions-Two Models to be Prepared Involving Rectangular, Triangular and Semi Circular Fits.
Text Books:
2. Workshop Manual, Department of Mechanical Engineering, SJCE, Mysore.

FUNCTIONAL ENGLISH
I Semester B.E. (Civil and Mechanical stream)
Sub. Code : HU120/HU220 Contact Hrs.: 2/Week
Credits : 2-0-0 Total Hrs.: 25

Course Outcomes
CO-1 To develop communicative skills in reading, writing, speaking and listening in English.
CO-2 To enable learners to get competency in various linguistic functions.
CO-3 To develop skills of interaction in personal and business English.
CO-4 To learn correct grammar usage to enable effective communication.

Syllabus
Class room teaching
1. Introduction: Importance of Languages
2. Grammar:
   a) Parts of Speech, Usage of Preposition and Article, Punctuation.
   b) Tenses & Degrees of Comparison.
   c) Transformation of Sentences: Active-Passive.
   d) Affirmative-Negative, Exclamatory-Assertive.
   e) Interrogative-Assertive, Kinds of sentences.
   f) Direct-Indirect Speech.
3. Vocabulary Usage: Homonyms, Correcting Spelling, One-word equivalents.
4. Precise Writing.

**Lab activities**
1. Communication skills such as group discussion, interview skills, asking questions, conveying information, telephone etiquette, presentation skills, debate/ written skills such as e-mail writing, report writing, resume writing, application for job, letter writing/Soft skills such as time management, decision making, conflict management/ Life skills such as inter-personal relationship, leadership skills, assertive skills.
4. Progressive levels of learning to upgrade from beginner to middle to advanced levels.

**Text Books:**

**References:**
1. English Rank Scorer, G. Sankaran, Addone Publishing group, Thiruvananantapuram, Kerala
2. English Grammar, Wren & Martin

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**ENGINEERING MATHEMATICS-II**
II Semester B.E. (Civil and Mechanical stream)

Sub. Code : MA210  
Credits : 3-1-0  
Contact Hrs.: 5/Week  
Total Hrs.: 39+26=65

**Course Objectives**
To equip the student with the mathematical tools, from calculus of several variables, necessary to understand topics covered in the engineering disciplines

**Course Outcomes**
Student should be able to:

**CO-1** Solve differential equations of electrical circuits, forced oscillation of mass spring and elementary heat transfer.

**CO-2** Solve partial differential equations in fluid mechanics, electromagnetic theory and heat transfer.

**CO-3** Analyze position, velocity, and acceleration in two or three dimensions using the calculus of vector valued functions.

**CO-4** Use curl and divergence of a vector valued functions in various applications of electricity, magnetism and fluid flows.

**CO-5** Evaluate double and triple integrals to find area, volume, mass and moment of inertia of plane and solid region.

**CO-6** To interpret large data, analyse and arrive at intelligent conclusions.

**Syllabus**
1. Linear ODEs of higher degree ; methods of solving - method of undetermined coefficients, variation of parameters; systems of ODEs; Legendre and Cauchy's equations. Formation of PDEs; solutions of non-homogeneous and homogeneous PDEs; method of separation of variables;  
   9 Hours
2. Vector differentiation, directional derivatives, gradient, divergence, curl; irrotational and solenoidal vector fields. 
   5 Hours
3. Line integrals: Paths and line integrals; basic properties; concept of work as line integrals; applications. 
   6 Hours
4. Multiple integrals: Double and triple integrals; evaluation by change of order and change of variables; application to areas and volumes; Green's theorem. 
   6 Hours
5. Surface integrals, Green's, Stokes and Gauss theorems, curvilinear coordinates. 
   8 Hours
6. Curve fitting - method of least squares; correlation and regression, coefficient of correlation, standard error of estimate; ANOVA. 
   6 Hours

Text Books:
1. Advanced Engineering Mathematics, Erwin Kreizyg

References:
1. Calculus, Volume I & II, T. M. Apostol
2. Differential Equations with Applications and Historical Notes, G. F. Simmons, Tata-McGraw Hill.

UNIT -I
ELECTROCHEMISTRY
Introduction, Single electrode potential - definition, origin, sign

**BATTERY TECHNOLOGY**
Introduction, definition, battery characteristics, classification - primary, secondary and reserve with examples. Modern batteries-construction, working and applications of Nickel-Metal hydride, Nickel-Cadmium, Lithium-MnO₂ and Li-ion batteries.

**FUEL CELLS**
Introduction, classification, construction and working of H₂-O₂ and methanol-oxygen fuel cells

12 Hours

**UNIT-II**

**CORROSION SCIENCE**

**ELECTROPLATING AND ELECTROLESS PLATING**
Importance, significance of polarisation, decomposition potential and over-voltage in electroplating processes. Electroplating process: effect of variables on the nature of electro deposit - current density, metal salt and electrolyte concentration, metal ion concentration, temperature, pH of the bath, additives; brighteners, levelers, structure modifiers and wetting agents, throwing power of the bath. Surface preparation - using solvents, alkali, acid and electropolishing. Electroplating of Cr and Ni. Electroless plating - differences between electroplating and electroless plating, advantages of electroless plating, electroless plating of copper on PCB.

12 Hours

**UNIT -III**

**ENERGY SOURCES**

**INSTRUMENTAL METHODS OF ANALYSIS**
Introduction, advantages over conventional methods. Principle, theory and applications of Colorimetry, Potentiometry and Conductometry.

9 Hours
UNIT-IV
WATER CHEMISTRY

CHEMISTRY OF NANOMATERIALS
Introduction, definition, classification of nanomaterials-0D spheres and clusters, 1D nano fibres, wires and rods (multilayers), 2D films, plates and networks, (Ultrathin-grained overlayers), 3D nanomaterials. General properties of nanomaterials, synthesis of nanomaterials - top down and bottom up approach-methods, Sol-gel method and chemical vapour deposition method. Applications of nanomaterials and nanotechnology.

UNIT-V
HIGH POLYMERS
Polymers-classification (natural and synthetic) with examples. Polymerisation; types-addition and condensation with examples. Free radical mechanism of addition polymerization. Methods of polymerization - bulk, solution, suspension and emulsion. Thermoplastics and thermosetting plastics with examples, weight average and number average molecular weight. Glass transition temperature (Tg) - parameters affecting Tg and significance of Tg. Synthesis, properties and applications of PTFE, PMMA and PU. Elastomers - definition, deficiencies of natural rubber, advantages of synthetic rubber, Vulcanisation of rubber. Synthesis and applications of neoprene and butyl rubber. Adhesives- definition, synthesis, properties and applications of epoxy resin. Conducting polymers - definition and mechanism of conduction in polyacetylene.

9 Hours

References:
STRENGTH OF MATERIALS
II Semester B.E. (Civil and Mechanical stream)

Course Objective
1. To introduce the concept of stress and strain.
2. To calculate the stresses and strains due to axial & shear loading and due to temperature variations.
3. To analyse the two dimensional compound stress system.
4. To study the variation of bending movement and shear force along the length of the loaded beam due to different types of loads and to study the resulting stresses.
5. To analyse the circular shafts subjected to torsional moment.
6. To analyse the long columns for their critical loads.

Course Outcomes
The student has the

CO-1 ability to calculate the stresses and strains due to axial & shear forces and also due to temperature variations .

CO-2 ability to analyse a two dimensional compound stress system.

CO-3 ability to draw bending moment and shear force diagrams for beams subjected to transverse loads and also to determine the bending and shearing stresses in beams.

CO-4 ability to determine the shear stress developed in shafts due to torsion and to design a shaft for the given conditions.

CO-5 ability to determine the critical and safe loads on long columns and also to determine the section of the long columns for the given conditions.

Syllabus
1. SIMPLE STRESSES AND STRAINS: Concept of Stress and Strain; St. Venant's Principle; Hooke's Law; Stress-Strain Diagram for ferrous and non-ferrous materials, True stress and strain; Elastic Constants - Young's modulus, Rigidity modulus, Bulk modulus and Poisson's ratio; Relationships among elastic constants; Deformation of uniform bars; Bars of varying cross section; Deformation due to self weight; Volumetric strain; Generalized Hooke's law; Composite sections; Temperature stresses; Statically indeterminate problems.

2. BENDING MOMENT AND SHEAR FORCE IN BEAMS: Definitions - Bending moment and Shear force, Relationship among Bending Moment, Shear Force and Load Intensity; Bending moment and Shear force diagrams for statistically determinate beams subjected to point force, UDL, UVL and couple.

3. STRESSES IN HOMOGENEOUS, PRISMATIC, STATICALLY DETERMINATE BEAMS: Simple Bending Theory; Moment of resistance; Section modulus of different cross sectional shapes; Variation of bending stresses across the cross section of a loaded beam; Shear stresses in beams and their distribution over the beam cross section; Beams of uniform strength.

4. TORSION OF SHAFTS: Torsion equation for circular shafts; Strength and Stiffness of solid and Hallow circular shafts (Uniform cross sections); Transmission of power.

5. COMPOUND STRESSES: Analysis of generalized two dimensional stress system - Normal and shear stresses on any inclined plane; Principal stresses and Principal planes; Maximum shear stresses and maximum shear planes; Pure shear stresses and pure shear planes; Mohr's circle of stresses.

6. THIN AND THICK CYLINDERS: Stresses in thin cylinders subjected to internal and external pressures; Hoop,
Longitudinal and Volumetric strains in thick cylinders; Lame's equations for stresses in thick cylinders.

7. **THEORY OF LONG COLUMNS:** Euler's formula for different end conditions; Effective length of column; Slenderness ratio; Rankine - Gordon Formula; Eccentrically loaded columns - Secant formula.

**Text Books:**


**References:**


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**PROGRAMMING IN C**

II Semester B.E. (Civil and Mechanical stream)

Sub. Code : CS210/CS110  
Contact Hrs.: 4/Week  
Credits : 4-0-0  
Total Hrs.:  52

**Course Outcomes**

After completing this course, students should be able to:

- **CO-1** Understand the basic principles of Programming in C.
- **CO-2** Understand the usage of Control structures in C language.
- **CO-3** Design and develop modular programming skills.
- **CO-4** Understand the concepts of Structures and pointers.
- **CO-5** Understands the concept of memory allocation and file handling.

**Syllabus**

**INTRODUCTION**

Introduction to computer concepts, Algorithmic approach to problem solving, Basic concepts of a C program, Data types, Declaration, assignment, Input & Output statement, Types of operators and expressions, Introduction to Preprocessors, Compiler control Directives, Programming examples and exercises.

10 Hours

**CONTROL STATEMENTS**

Branching: Different types of if statements, switch statement, ternary operator, use of goto statement. 
Loops: for loop, do-while loop and while loop in C, nesting of loops, break, continue and exit statements. Programming examples and exercises.

10 Hours

**ARRAYS, STRINGS AND FUNCTIONS**

Arrays: Declaring, Initializing and using 1-D and 2-D arrays. Programming examples and exercises.

Strings: Declaring, Initializing, Printing and reading strings,
strings manipulation functions, strings input and output functions, arrays of strings, Programming examples and Exercises using and without using built-in functions.
Functions: Functions in C, Argument Passing, Functions and program structure, location of functions, Different types of Functions, Recursion, programming examples and exercises.

12 Hours

STRUCTURES AND POINTERS
Structures: Basic of structures, structures and Functions, Arrays of structures, structure Data types, type definition, Unions. Programming examples and exercises.
Pointers: Pointers and address, pointers and functions arguments, pointers and arrays, address arithmetic, character pointer and functions, pointers to pointer. Programming examples and exercises.

10 Hours

DYNAMIC MEMORY ALLOCATION AND FILE MANAGEMENT
Files: Introduction, Defining, opening and closing of files, Input and output operations, programming examples and exercises.

10 Hours

Text Books:

References:

COMPUTER AIDED ENGINEERING GRAPHICS
II Semester B.E. (Civil and Mechanical stream)
Sub. Code : ME210/ ME110 Contact Hrs.: 6/Week
Credits : 2-0-2 Total Hrs.: 26+52=78

Course Objectives:
1. To identify the importance of Engineering Graphics and know its relevance in Engineering Applications.
2. To explain Orthographic Projection and to describe recognize its importance.
3. To explain the process of projection on HP, VP and PP.
4. To identify when a surface is seen in its true and apparent shape on HP, VP and PP and to locate the same in a drawing.
5. To identify and reason, in a drawing, which surfaces, edges appear in their true shapes and which surfaces don't appear in their true shapes.
6. To explain the importance pictorial representation of objects.

Course Outcomes
CO-1 The student must be able to prepare the three views of a geometrical object like points, line, planes, and solids in their given position with reference to the planes of projection.
CO-1 Must be able to read a drawing and understand the information contained in it.
CO-1 Must be able to translate a given orthographic projection into an Isometric projection and vice versa.
CO-1 Should illustrate the capability to prepare orthographic views of simple machine components.

Syllabus
1. Introduction: Drawing Instruments and their uses, BIS conventions, Lettering, dimensioning computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational...
tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D / 3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering.  

6 Hours

2. **Orthographic Projections:** Introduction—quadrants, planes of projection, reference line. Projection of points located in all the four quadrants. Front view, top view and side view. Typical problems on points and reading them 

6 Hours

3. **Projections of straight Lines:** (Located in first quadrant only) Introduction—true length, apparent length true inclination and apparent inclination. Line inclined to both HP and VP. 

09 Hours

4. **Projections of plane surfaces Introduction:** projection of plane surfaces—triangle, square, rectangle, rhombus, pentagon, hexagon and circle. Planes in different positions by change of position method only. 

12 Hours

5. **Projections of Solids:** Introduction: projection of right regular triangular, square, rectangular pentagonal, hexagonal prisms and pyramids, cylinders, cones Tetrahedron and hexahedron (cube) in different positions when solid rests on HP and axis inclined to both HP and VP 

18 Hours

6. **Development of surfaces:** Development of lateral surfaces of right regular prisms, pyramids, cylinder and cones, resting with its base completely on HP and their frustums and truncations. Tetrahedron and hexahedron (Cube) when it rests on one of its face on HP. 

12 Hours

7. **Isometric Projections:** Introduction: Isometric projection, Isometric view or drawing and Isometric Scale. Isometric projection of simple plane figures, solids & combination of solids 

12 Hours

**Text Books:** 

**References:** 
ENGINEERING CHEMISTRY LABORATORY
II Semester B.E. (Civil and Mechanical stream)
Sub. Code : CH12L/ CH22L Contact Hrs.: 3/Week
Credits : 0-0-1.5 Total Hrs.: 39

Course Objectives
To impart practical knowledge in the field of chemical analysis with respect to conventional and instrumental methods of chemical analysis.

Course Outcomes
CO-1 Understanding the techniques involved and advantages of instrumental methods over the conventional methods
CO-2 Assessment of water quality parameters like hardness & alkalinity and judging the suitability of water for domestic and industrial applications.
CO-3 Assessment of waste water quality parameters like BOD and COD in determining the extent of pollution.
CO-4 Understanding the importance of alloys as an engineering material and to analyzing them by instrumental techniques.
CO-5 Assessment of quality of haematite used for metallurgical operation.
CO-6 Applications of analytical techniques like potentiometry, colorimetry and conductometry for accurate chemical analysis.

Syllabus

PART - A
1. Determination of total hardness of water by EDTA Method.
2. Determination of total alkalinity of water sample and identification of the type and extent of alkalinity.

3. Determination of percentage of Copper in brass in the given sample of brass by iodometric method.
5. Determination of Dissolved Oxygen of the given water sample by Winkler's method

PART - B
1. Determination of $pK_a$ of weak acid using pH meter.
2. Estimation of iron in stainless steel/ FAS potentiometrically using standard solution of potassium dichromate.
3. Conductometric estimation of HCl and CH$_3$COOH present in a mixture using standard solution of sodium hydroxide.
4. Determination of copper colorimetrically using ammonia as the complexing agent.
5. Determination of iron (III) by colorimetric method using potassium thiocyanate as the complexing agent.
6. Determination of equivalent conductance of strong electrolyte at infinite dilution.
7. Flame photometric method of determining sodium in water sample.

References:
3. Water and waste water analysis by American -method (APHS).
C PROGRAMMING LABORATORY
II Semester B.E. (Civil and Mechanical stream)

Sub. Code: CS22L/CS12L  Contact Hrs.: 3/Week
Credits: 0-0-1.5  Total Hrs.: 50

Course Outcomes
After completing this course, students should be able to:

CO1 Analyze the behavior of simple programs involving the basic constructs.
CO2 Execute programs using sequential, conditional and iterative control structures.
CO3 Design, implement, test and debug programs that use single and two dimensional arrays.
CO4 Program with String handling functions.
CO5 Design programs using the concept of structure, pointers and file handling.

Syllabus

LAB EXPERIMENTS

NOTE: Tutor will design the lab cycle to cover the following concepts.
1. Understanding programming environment, operating system and source editors.
2. Programs which includes sequential execution involving different C operators.
3. Programs that use control structures including switch-case.
4. Iterative constructs. (do, while, for)
5. Applications of single dimensional array and two dimensional array.
6. String handling and use of unformatted I/O functions.
7. User defined functions, recursive function
8. Introduce the concept of structures, pointers and file handling.

LIST OF EXPERIMENTS

LAB CYCLE - I
1. Accept two numbers and perform basic arithmetic operation. (+, -, *, /, %)
2. Programs to perform mathematical operations using built-in functions. (sqrt, abs, fabs, pow)
3. Program to find area/volume of geometrical shapes (Circle, square, rectangle, triangle-given three sides, given base and height)
4. Program to convert temperature to Fahrenheit and vice versa.
5. Program to compute simple and compound interest.
6. Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z and z has the value of x.
7. Write a program that reads floating-pointing number and then displays the right-most digit of the integral part of the number.
8. Write a program that reads floating-pointing number, separate and displays the integral and decimal part of the given.

LAB CYCLE - II
1. Program to perform the following using ternary operator
   (a) check if given number is positive or negative
   (b) find the largest of two/three numbers
2. Program to check if given number is even or odd using bitwise & operator
3. Program to perform the following using bitwise operators:
   c = a & b;  d = a | b;  e = ~a
   f = a>>n;  g = a<<n;  h = a'b
4. Program to find the remainder of a/b without using % operator
5. Program to illustrate the use of postfix/prefix increment/decrement operators.
6. Write a program to print the size of various data types in C.
LAB CYCLE - III
If statements
1. Write a program to determine whether a given number is Positive / Negative / Zero
2. Write a program to find the largest of two/three numbers
3. Write a program to determine whether a given number is 'odd' or 'even' and print the message NUMBER IS EVEN or NUMBER IS ODD with and without using else option.
4. Design, develop and execute a program to find and output all the roots of a given quadratic equation, for non-zero coefficients.
5. Declare the class based on 6 subject marks of a student.
6. Generate electricity bill depending on the Units consumed and varying rates for Units consumed.
7. Write a program to determine whether a given year is leap year or not.

Switch-Case
8. Write a program to input month number and display its respective month in words.
9. Write a program to simulate Simple calculator.

LAB CYCLE - IV
Loop Statement
1. Write a program to sum odd and even numbers up to 'n'
2. Write a program to generate and print first 'n' Fibonacci numbers
3. Write a program to find the sum of digits of a number reducing into single digit
4. Write a program to implement Euclid's algorithm to find the GCD and LCM of two integers and to output the results along with the given integers.
5. Write a program to reverse a given four digit integer number and check whether it is a palindrome or not. Output the given number with suitable message.
6. Write a program to display all the number between 1 and N which are divisible by 8.
7. Write a program to determine whether a given number is prime or not.
8. Write a program to generate and print all the prime numbers between given range
9. Write a C program to find the value of sin(x) using the series x - x³/3! + x⁵/5! - x⁷/7! + x⁹/9! - .. up to N terms accuracy (without using user defined function). Also print sin (x) using library functions.
10. Write a C program to find the value of cos(x) using the series 1 - x²/2! + x⁴/4! - x⁶/6! + x⁸/8! - ... Up to N terms accuracy (without using user defined function). Also print cos(x) using library function.

LAB CYCLE - V
One-dimensional array
1. Write a C program to input N numbers and perform linear search for a given key number.
2. Design, develop and execute a program in C to input N integer numbers into a single dimension array, sort them in to ascending order using bubble sort technique, and then to print both the given array and the sorted array with suitable headings.
3. Design, develop and execute a program in C to input N integer numbers in ascending order into a single dimension array, and then to perform a binary search for a given key integer number and report success or failure in the form of a suitable message.
4. Write a C program to input N real Numbers and to find mean, variance and standard deviation using appropriate formula.

Two-dimensional array and user-defined functions
1. Write a C program to read two matrices A (M x N) and B(M x N) and perform addition OR subtraction of A and B. Output the given matrices, their sum OR differences..
2. Write a C program to read a matrix A (M x N), find the transpose of the given matrix and output both the input matrix and the transposed matrix.
3. Write a C program to read a matrix A (M x M), find the trace and norm of the matrix and output the input matrix, trace and norm.
4. Write a recursive function to compute the factorial of a Number.

LAB CYCLE - VI
1. Write a program to check whether the given string is palindrome or not without using built-in function. Use unformatted I/O functions.
2. Write a C program to demonstrate the concepts of Pointers.
3. Write file handling programs to illustrate the following concepts:
   a. Read a line of text and store it in a file.
   b. Read the contents of a file and display the same on the monitor.
   c. Copy the content of one file to another.
   d. Write a C program to generate 1000 random integer numbers using built-in function and store them in a file.
4. Write a C program to demonstrate the usage of Structures.

Text Books:

References:

Course Objective
This is a core subject and this has been prescribed in the first/second semester with the intention of providing the importance of innovations which have global presence. Students after having completed their pre-university in science streams are able to demonstrate their core competency subjects like mathematics and science. Further, their ideation process with better creative concepts combined with ideation techniques could be useful to modulate the innovations needs of their branch of engineering.

Course Outcomes
CO-1 Identify the need for innovation and its global presence and its development in various branches of engineering.
CO-2 Comprehensively classify innovation, recognize and understand the importance of various types of innovation.
CO-3 Evaluate the scope for innovations and appreciate the methods of protection to innovations.
CO-4 Analyze innovations the past and present and study the possibility of development of few of the innovations in their branches of engineering.
CO-5 Utilize available resources and aim at the development of a project and attempt to document, publish and participate in events which could showcase their contributions to make concept a reality.

Syllabus
CHAPTER - 1
INTRODUCTION - Innovation, Inventions And Discovery, Invention - Necessity Examples, Inventions Of the Past And
Present, Innovation - Definition, Need For Innovation, Comparison Of Innovations And Inventions, Ideas - Types Of Ideas, Examples, Innovation of Products & Services - Based on Modifications and Adaptations With Examples Of Product Innovation, Service Innovation, Innovations Of Modern Era Listing Of Products/Services, Role Of Creativity And Intelligence In Innovation, Classification Of Innovation - Based On Category - Product Innovation, Process Innovation, Service Innovation, Marketing Innovation, Organizational Innovation, Based On Overall Global Needs - Technological Innovation, Social Innovation, Based On The Degree Of Novelty - Incremental Innovations, Radical Innovations, Systemic / Systematic Innovations, Advantages And Disadvantages Of Innovation

10 Hours

CHAPTER - 2
NEED for INNOVATION - Need for innovation- Importance of innovation- business needs, social needs, Technological, Scientific and other needs. Examples of new product development, stages of new product development, concept building, idea generation, product screening, concept testing, market survey, prototyping, test marketing, finalization, manufacturing, advertising.

4 Hours

CHAPTER - 3
PROTECTION to INNOVATION - Safeguarding innovation, methods of protection, copy right, trademarks, Intellectual Property Rights (IPR). Method of Protection, Procedure for IPR. A system is developed in around a product and/or service, Brief description for these procedures.

4 Hours

CHAPTER - 4
INNOVATION EXAMPLES - Products/Services - case study discussions - Branch specific selected examples.

6 Hours

References:

Other Materials
1. Materials For Group/Individual Assignments
2. Paper Clippings - From News Papers, Magazines
3. Articles From Work Books
4. Presented Papers Of Conferences, Seminar/Symposia Articles
5. Company Brochures, Pamphlets
6. Advertisements Published In News Papers/Magazines
7. Branch's Relevant National And International Society Information
8. Any Other Materials Available In Websites
KANNADA
I/II Semester B.E. (Common to All Branches)

Sub Code : HU 230/HU130
Contact Hrs : 2/week
Total Hrs : 26

1) ಸಂಗ್ರಹ (ಸಿಬ) ಆರೋಗ್ಯ
2) ಸಂಘಾತಾಧಾರದಲ್ಲಿ ವಸ್ತುವು ಹಾನಿ (ಅಂತ್ಯವು) ಜ್ಞಾನ ರೂಪದಸ್ತ್ರ
3) ವೈದ್ಯ ವೀರಶಾಸನಗಳು (ಸುತ್ತಕಾರೆ ಸಂಗ್ರಹ) ವೈದ್ಯರು ರೂಪದಸ್ತ್ರ
4) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ಸುತ್ತಕಾರೆ) ರೂಪದಸ್ತ್ರ
5) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ಸುತ್ತಕಾರೆ) ಸಂಶೋಧನ ಶಾಸ್ತ್ರ ಆಧಾರ
6) ಇತಿಹಾಸಿಕ ಸಂಶೋಧನ (ಹಬೂದು ಶಾಸ್ತ್ರ) ನಡುವಿನ ಶಾಸ್ತ್ರ
7) ಪ್ರೆಸ್ಸ್ ರಂದು (ಸ್ವರೂಪ) ಸಂಶೋಧನ
8) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ವಿದ್ಯಾರ್ಥಿ) ಸ್ವತ ಶಾಸ್ತ್ರ
9) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ವಿದ್ಯಾರ್ಥಿ) ಸ್ವತ ಶಾಸ್ತ್ರ
10) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ವಿದ್ಯಾರ್ಥಿ) ರೂಪದಸ್ತ್ರ ಮಾದರಿಯ ಶಾಸ್ತ್ರ
11) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ವಿದ್ಯಾರ್ಥಿ) ರೂಪದಸ್ತ್ರ ಉತ್ತಮ
12) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ವಿದ್ಯಾರ್ಥಿ) ರೂಪದಸ್ತ್ರ ಉತ್ತಮ
13) ಗ್ರಾಮೀಣ ವಿದ್ಯಾರ್ಥಿಗಳು ವಿದ್ಯಾರ್ಥಿ (ವಿದ್ಯಾರ್ಥಿ) ಅನುವಾದಿಕೆ
14) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ವಿದ್ಯಾರ್ಥಿ)
15) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ವಿದ್ಯಾರ್ಥಿ) ರೂಪದಸ್ತ್ರ ಉತ್ತಮ
16) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ವಿದ್ಯಾರ್ಥಿ) ರೂಪದಸ್ತ್ರ ಉತ್ತಮ
17) ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಶೋಧನ (ವಿದ್ಯಾರ್ಥಿ) ರೂಪದಸ್ತ್ರ

ಶೀತ್ಲ ವಿದ್ಯಾರ್ಥಿ:
1. ಕುರಿತಬೇಕಾದ, ಅಂದ ವಿದ್ಯಾರ್ಥಿ ಸಂಶೋಧನ, ಅಂದ.
Abstract: An autonomous path-planning strategy based on Skinner operant conditioning principle and reinforcement learning principle is developed in this paper. The core strategies are the use of tendency cell and cognitive learning cell, which simulate bionic orientation and asymptotic learning ability. Cognitive learning cell is designed on the base of Boltzmann machine and improved Q-Learning algorithm, which executes operant action learning function to approximate the operative part of robot system. To reduce this TGC without relying on fast communication links, an autonomous droop scheme is proposed here, whose resulting power sharing is decided by the individual DG generation costs. Comparing it with the traditional scheme, the proposed scheme retains its simplicity, and it is hence more likely to be accepted by the industry. The reduction in TGC has been verified by experiment.