B.E. SYLLABUS

I & II SEMESTER

With

Scheme of Teaching

& Examination
### Scheme and Course Content for I and II Semester

**Common to All Branches**

**Scheme of Teaching and Examination**

#### I Semester B.E.

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15MA101 - ENGINEERING MATHEMATICS-I

Subject code : 15MA101
No. of Credits : 04
Hrs/Week : 4
Total Hours : 52

Course Objectives:
1. To build a strong foundation in the mathematical tools of calculus and matrices which are useful in various engineering fields.
2. To make the student to solve engineering problems by building mathematical models.
3. To introduce the student to the concept of infinite series and nature of convergence and divergence.
4. Introducing basics of Linear algebra which is useful to understand their technical subjects.

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

1. Solve systems of linear equations and learn the concept of linear transformations so that they can apply them in their field of study.
2. Determine the nature of a given infinite series, whether it converges or diverges.
3. Learn the concept of partial differentiation of a function of two or more independent variables and apply them to solve engineering problems.
4. Understand the concept of radius of curvature and mean value theorems.
5. Understand and apply integral calculus techniques to find the area, length of an arc, Volume and surface area of curves.

UNIT – I

Linear algebra:
Vectors, linearly dependent and independent set of vectors, elementary row transformation of a matrix, rank of a matrix, Gauss elimination method, Gauss seidel method, Eigen values, Eigen vectors of square matrices, Rayleigh’s power method to find the largest eigen value and the corresponding eigen vector. Linear transformation and diagonalization of a square matrix, quadratic forms, reduction to canonical form by orthogonal transformation.

10 Hours

UNIT - II

Infinite Series:
Convergence and divergence of infinite series, Comparison test, Ratio test, Cauchy’s root test, Cauchy’s integral test.
Determination of nth derivatives of some standard functions, Leibnitz’s theorem (statement only), illustrative examples. Taylor’s theorem for a function of single variable (Without proof), Expansion of functions into Taylor and Maclaurin’s series.

10 Hours
UNIT - III

Partial Differentiation:

Euler’s theorem. Total differentiation. Differentiation of composite and implicit functions, Jacobians , Errors and approximations. Taylor’s theorem for a function of two variables , Maxima and Minima for a function of two variables- Lagrange’s method of undetermined multipliers(with one subsidiary condition).  

10 Hours

UNIT – IV

Differential calculus:

Polar curves, Angle between the radius vector and the tangent. Angle between two curves, pedal equation for polar curves.Derivatives of arc and radius of curvature - Cartesian, parametric, polar forms. Rolle’s Theorem (Without proof) Lagrange’s and Cauchy’s Mean Value Theorems. matrix theory.  

10 Hours

UNIT – V

Integral Calculus:

Reduction formulae for the integrals of functions $\sin^n x, \cos^n x, \sin^m x \cos^n x$. Evaluation of these integrals with standard limits- problems. Tracing of standard curves in Cartesian form , parametric form and polar form. Applications to find area and length of given curves, volumes and surface areas of solids of revolution.  

12 Hours

TEXT BOOKS:


REFERENCE BOOKS:

15PH102 - ENGINEERING PHYSICS

I/II Semester B.E
Sub Code : 15PH102                   No of credits : 04
Hrs/week : 4                          Total hours : 52

Course Objectives:

1. To provide adequate education in Physics to have a basis for a complete understanding of current and future scientific and technological developments.
2. Expose students to many examples of fundamental Physics applied towards practical problems, and facilitate the development of student's ability to solve practical problems using fundamental Physics principles.
3. Expose students to environmental, ethical and contemporary issues, including the historical advancements made in the field of Physics, the innovations they have led to and their societal impact.

Course Outcomes:

Upon completion of a course in Engineering Physics, students should be able to demonstrate:

1. An ability to have the factual knowledge and other thinking skills necessary to construct an appropriate understanding of physical phenomena in an applied context.
2. An ability to identify, formulate, and solve Physics and Engineering problems.
3. An understanding of professional and ethical responsibility.

UNIT - I

DIELECTRIC PROPERTIES OF MATERIALS

Electrical polarization: Dielectrics, dipoles, electric polarization in polar and nonpolar molecules, Mechanisms of electrical polarization, dielectric flux (D=ε₀ εᵣ E and εᵣ=Co/Cmat – no derivation ), Electric susceptibility (relation between P, χ and E - no derivation), Internal fields in liquids and solids (theory based on one dimensional atomic array), Dielectric constant for isotropic solids (Clausius-Mossotti Relation), temperature dependence of Dielectric constant

Dielectric AC field : Frequency dependence of dielectric constant, Dielectric loss (derivation), dielectricbreakdown, Types of dielectric materials, Piezo and ferroelectric materials and applications.

10 Hours
UNIT - II

Physics of Conductors, Semiconductors and Superconductors

Conductors: Electrical conductivity in metals (Lorentz and Drude theory), drift velocity, mean free path, relaxation time, mobility, expression and explanation of electrical conductivity (derivation), effect of temperature and impurity on electrical resistivity of metals

Semiconductors: Band theory of solids, classification of solids, Fermi level in a semiconductor and its behavior with temperature, Fermi energy, fermi factor, Fermi-Dirac distribution (qualitative explanation), Expression for conductivity in terms of mobility, Hall effect-theory with derivation for carrier concentration and Hall coefficient. Superconductor: Introduction to superconductors (temp dependence) and their properties (Meissner effect, critical field and magnetic flux), BCS theory, Type I and type II superconductors. Applications (qualitative)

12 Hours

UNIT - III

Applied Optics


Optical Fibers: Propagation mechanism in optical fibers, Acceptance angle, condition for propagation, numerical aperture, type of optical fibers and modes of propagation, attenuation, Optical sensors

10 Hours

UNIT- IV

Crystal Structure, X-rays and Ultrasonics

Space lattice, unit cell, primitive cell and parameters, seven crystal systems. bravais crystal system. Directions and planes in a crystal, Miller indices, Expression for interplanar spacing, Coordination number and atomic packing factor. Crystal structures of CsCl, ZnS and Diamond.
X rays: Properties, origin of X rays (continuous and characteristics), Bragg’s law, crystal structure determination.

Ultrasonics: Methods of Production (qualitative), properties, Measurement of ultrasonic velocity and elastic constants of the medium, Nondestructive testing by pulse echo method.

10 Hours

UNIT - V

Quantum Physics and Nano Science

Quantum Physics: Introduction, wave – particle dualism, the wave equation, Time independent Schrodinger’s wave equation (derivation in complex notation) in one dimension. Applications of Schrodinger’s equation: Particle in one dimensional potential well of infinite height- Energy Values.

Nano Science: Brief introduction to nano science, self assembly, self organization, Scaling laws in miniaturization (with examples in mechanical, electrical and electrostatic system), Fabrication processes: Top-down approach: milling and Lithography and Bottom-up approach: Physical vapor phase deposition and sputtering. Carbon nanotubes and wires.

10 Hours

TEXT BOOKS:

5. B.L.Theraja, “Modern Physics” (for X rays)

REFERENCE BOOKS:

2. B.B.Laud,”Laser and Non –Linear optics” Wiley Eastern Ltd.
5. Nanosystems-Molecular Machinery, Manufacturing and Computation - K.Eric Drexler
Course Outcomes: At the end of the course the student is expected to,

1. Make the students aware of scope & importance of Civil Engineering.
2. Improve the logical thinking and analytical skills.
3. Build a strong foundation in engineering mechanics to serve as a basis for mechanics of solids & design of structural elements.
4. Calculate the resultant of coplanar concurrent and non-concurrent force systems.
5. Understand equilibrium and solve problems on equilibrium of coplanar concurrent force system.
6. Identify different types of supports, loadings and determinate beams.
7. Find the support reactions for determinate beams.
8. Understand the types of friction and to solve related problems.
9. Compute the centroid and moment of inertia of typical sections.
10. Analyse problems in dynamics using D’Alembert’s Principle, work-energy principle and impulse-momentum principle.

UNIT - I

Scope and importance of different fields of Civil Engineering.

Introduction to Engineering Mechanics: Basic idealizations - Definition of force, Characteristics of a force, Force systems and classification; Axioms of Mechanics. Concept of free body diagram. Resolution of forces, Composition of forces - Definition of Resultant; Resultant of coplanar concurrent force system.  

UNIT - II

Moment of a force, couple, characteristics of couple, Equivalent force - couple system; Varignon's theorem, Resultant of coplanar - non-concurrent force system.
Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems. Equilibrium of coplanar concurrent force system.  

**UNIT - III**

Equilibrium of coplanar non concurrent force systems: Simple, Hinged and fixed supports, Point, udl and uvl loads, support reactions for statically determinate beams.


**UNIT - IV**

Centroid of plane figures; Locating the centroid of rectangular, triangular, semicircular, quarter of a circular area and sector of a circular areas using method of integration, Centroid of simple built up sections (consisting of three components).

Moment of inertia of an area, polar moment of inertia, Radius of gyration, Perpendicular axis theorem and Parallel axis theorem; Moment of Inertia of rectangular, triangular, semicircular, quarter of a circular area and sector of a circular areas from the method of integration; Moment of inertia of composite areas (consisting of three components).

**UNIT - V**

Kinetics of rigid bodies, Dynamic equilibrium, D’Alembert’s principle, work-energy and impulse momentum principle, impact of elastic bodies (direct central impact).

**TEXT BOOKS:**


**REFERENCES BOOKS:**

**Course Outcomes:**

At the end of the course the student should be able to

1. Know about sources of energy and working principle of boilers
2. Understand the working principle of prime movers
3. Assimilate about refrigeration, air conditioning, lubrication and bearings
4. Understand the working of machine tools
5. Calculate speed ratios in power transmission and also know about joining process such as welding, brazing and soldering

**UNIT – I**

Properties of Steam: Steam formation, Types of Steam, Steam properties, States of steam (Simple numerical problems).  

Steam boilers: Definition and function of boilers, Classification of boilers, Details of Cochran boiler, Babcock & Wilcox boiler. Functions of all boiler mountings & accessories.

Working of a Thermal Power Plant using block diagram.

Steam turbines - Classification, Principle of operation of Impulse and reaction turbines, Delaval’s turbine, Parson’s turbine. (No compounding of turbines).

**UNIT – II**

Gas turbines: Classification, Working principles and Operations of Open cycle and closed cycle gas turbines.

Working of a Hydro Electric Power Plant using block diagram.

Water turbines- Classification, Principles and operations of Pelton wheel, Francis turbine and Kaplan turbine.

Internal Combustion Engines - I.C. Engines parts, 2 Stroke and 4 stroke Petrol engines, 4 stroke diesel engines. Simple problems to determine indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency.
UNIT – III

Machining Operations: Introduction to machine tools
Lathe operations - Turning, facing, Boring, Taper Turning and thread cutting
Drilling operations - drilling, Counter Sinking, Counter Boring,
Milling operations - Plane milling, End milling, Slot milling.
Grinding operations - Surface grinding, Cylindrical grinding (external and internal), centerless grinding.
(No sketches of Machine tools, sketches to be used only for explaining operations. Demonstration of machining operations) 6 Hours

Automation: Definition, types – Fixed, Programmable & Flexible automation, CNC machines: Basic elements with simple block diagrams, applications. 2 Hours

Robotics: Introduction, classification based on robots configuration and joints: Cartesian, polar, articulated; Application. 3 Hours

UNIT – IV

Pumps and compressors: Classification of pumps and compressors, working principle of centrifugal liquid pump and reciprocating air compressors. 3 Hours

Refrigerants: properties of refrigerants, list of commonly used refrigerants. Refrigeration – Definitions – Refrigerating effect, Ton of Refrigeration, COP, Principle and working of vapor compression refrigeration and vapor absorption refrigeration, working Principles of air conditioners. 7 Hours

UNIT – V


Bearing and Lubrication- Function and Classification, Ball and Roller Bearing
Function of a lubricant, Types of lubricants, Properties of a good lubricant. 3 Hours

Soldering, Brazing and Welding: Definitions, classification and method of soldering, Brazing and welding. Differences between soldering, Brazing and Welding. 3 Hours
TEXT BOOKS:


REFERENCE BOOKS:


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15EE105 - BASIC ELECTRICAL ENGINEERING

Sub code : 15EE105  
No. of Credits : 04  
Hrs / Week : 4  
Total Hours : 52

Course Objective:

To familiarize the student with the basic concepts in Electrical Engineering. Student will learn solving DC circuits, single phase AC series, parallel circuits. They will also know at the end of the course the basic principle of operation of electrical machines like Transformers, Induction motors, DC machines and Synchronous machines. In addition, they will also understand the basic concepts of electrical measurements, wiring, appliances and electrical earthing.

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

1. Analyze and solve problems pertaining to DC circuits and electromagnetism, imply star/ delta reduction technique
2. Deduce the parameters of single phase A.C circuits such as impedance, current, power factor for RLC series and parallel configuration.
3. Expound the fundamentals and operation of three phase circuits, measuring instruments, single phase Transformer, compute transformer efficiency at different loads and power factor
4. Explicate the construction, operation of DC machines, synchronous generator and analyze the given data to compute EMF, torque.
5. Comprehend the basic fundamentals, classifications of Induction motors, concept of slip, compute synchronous speed, safety measures, types of fuse and switch

UNIT - I

• DC Circuits:
  o Introduction to DC circuit-Review of basic circuit elements and variables, Ohm’s law and simple reduction of series, parallel and star-delta connection of resistors, formulation of network equations using KCL & KVL (with a maximum of 3 mesh, 3 node equations) for circuits with two sources

  5 Hours

• Electromagnetism:
  o Faraday’s law, Lenz’s law, Fleming’s rules, statically-induced and dynamically induced EMF, concept of self and mutual inductance, energy stored in magnetic field, lifting power of magnet.

  4 Hours

UNIT - II

• Single-phase AC Circuits
  o Generation of sinusoidal AC voltage, concept of average and RMS values, form factor, peak factor, voltage, current, power, power factor and energy. Phasor algebra and phasor diagram. Analysis of series, parallel and series–parallel simple circuits.

  10 Hours

UNIT – III

• Three-phase AC Circuits
  o Necessity and advantages of three-phase systems, star-delta connections, relationship between line and phase voltages, expression for three-phase power, measurement of three-phase power using two wattmeters.

  4 Hours
• Transformers:
  o Construction and Principle of operation of single phase transformer, EMF equation, power losses, definition of efficiency and voltage regulation, Principle of operation of autotransformer.

  3 Hours

• Measuring Instruments
  o Construction and Principle of operation of Ammeters, voltmeters, dynamometer type wattmeter, Construction and principle of operation of single-phase energy meter

  3 Hours

UNIT - IV

• DC Machines
  o Construction and Working principle of DC machines: generator and motor, EMF equation of generator, problems, back EMF and torque equations of DC motors, problems, types of DC motors, characteristics and applications, necessity of starter

  7 Hours

• Synchronous Generators
  o Construction and Principle of operation of alternator, brief discussion on the features of excitation, EMF Equation (derivation of pitch and distribution factors excluded), voltage regulation.

  3 Hours

UNIT - V

• Induction motors

  6 Hours

• Domestic Appliances
  o Wiring diagram of connecting domestic appliances to mains, specification of wires, Principle of working of fluorescent lamp, Applications and features of Sodium vapor lamp. CFL. Two-way and three-way control of lamps, necessity and types of earthing, specification of switches, fuses, selection of range, concept of overloading and protection of appliances, MCB (limit switch)

  4 Hours

TEXT BOOKS:

REFERENCE BOOKS:
1. V. K. Mehta, Principles of Electrical Engineering and electronics, 2000

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15ME106 - ENGINEERING SKILL DEVELOPMENT LAB

Sub code : 15ME106 No. of Credits : 01
Hrs / Week : 3 Total Hours : 36

Course Outcomes

At the end of the course the student should be able to

1. Develop simple mechanical models by fitting, carpentry and sheet metal work
2. Able to Identify and explain the use of different types of wiring tools, switches, fuse, sockets and plugs etc and to prepare simple wiring circuit.
3. Understand the use and function of various automobile parts.
4. Understand the operation of Lathe, milling, grinding and CNC machine.

PART- A

1. Fitting Shop:

Study and use of engineering steel rule, height gauge, caliper, micrometer, files, chisels, hacksaw, hammers, drill bit, taps etc.

Models: Preparation of fitting models by making use of filing, sawing, chipping, drilling and tapping.

2. Sheet metal and soldering:

Study the use of sheet metal work and soldering tools. Study the development of surfaces of simple solids like prism, cylinder and cone.

Models: Preparation of sheet metal model of prism (square and rectangle), cylinder and frustum of cone.

PART- B

3. Carpentry Shop:

Study and use of wood working tools, joints etc.
Models: Preparation of any one carpentry joints like mortise or tenon joint.

4. **Automobile Shop:**

Study the use and function of various automobile parts.

5. **Machine Shop:**

Study the operation of Lathe, milling, grinding and CNC machine.

6. **Electrical wiring lab:**

Identification and study the use of different types of wiring tools, switches, fuse, sockets and plugs etc.

Demonstration of simple electrical device like fan, washing machine, pump starter etc.

Experiments: Preparation of simple wiring circuit.

**REFERENCES BOOKS:**


**Scheme of examination for Workshop Practice.**

<table>
<thead>
<tr>
<th>PART- A</th>
<th>PART- B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fitting model</td>
<td>30 Marks</td>
</tr>
<tr>
<td>2. Sheet metal model</td>
<td>10 Marks</td>
</tr>
<tr>
<td>3. Viva-voce</td>
<td>10 Marks</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>50 Marks</strong></td>
</tr>
</tbody>
</table>

**************************
Course Objectives:

Students should be able to:

1. Develop in themselves a Social, Political, Economic, Cultural Awareness.
2. Understand their Obligations, Responsibilities, Privileges and Rights, Duties and the Role that they have to play in deciding the Administrative Machinery of the country.
3. Consider inculcating the National and Patriotic Spirit among themselves as responsible citizens of the country.
4. Imbibe Ethical values of business and realize the responsibility and obligations of Professionals to the Society and Nation.
5. Interpret the Scope and Aims of Engineering Ethics, their responsibilities, virtues and traits of right behaviour such as Honesty, Integrity and Reliability, the Risk and Liability in the Engineering profession.

Course Outcomes:

1. By the end of the course the students will be able to:
2. Understand and analyze the constitutional provisions and privileges made available to the people.
3. Prepare oneself to render the social and national services and their duties envisaged in the Constitution of India.
4. Contribute towards the nation building
5. Uphold the dignity of the individual and the nation
6. Able to respect the Constitutional Institutions like Judiciary, Executive, Legislature and also to respect the national flag, national anthem and all those noble ideals cherished by the those great leaders and our ancestors during Indian struggle for freedom.
7. To contribute in protecting and preserving the sovereignty and integrity of India and have a compassion to all living creatures, uphold sense of brotherhood among all citizens of the nation and promote peace and harmony.
8. Be a part of nation building.

UNIT - I

Chapter – 1 : Introduction, Historical Background (Evolution – in brief),

Chapter – 2: Importance, Scope and Extent of Limitations (Restrictions) of different kinds of Fundamental Rights in brief as given under Part III

UNIT - II


Chapter – 4: Significance of Fundamental Duties under Part IVA; Article 51A.

Chapter – 5: President of India, Qualifications, Manner of Election, Impeachment, Powers and Functions, Vice- President.

Chapter – 6: Prime Minister – Manner of Selection / Appointment, Role of Prime Minister under the Constitution - Council of Ministers and their Role - Parliament – Composition, Powers and Functions.

Chapter – 7: The Supreme Court of India – Powers and Functions, Appointment of Judges, Qualifications and Impeachment.

UNIT- III

Chapter – 8: Governor – Manner of Appointment – Powers and Functions.

Chapter – 9: Chief Minister – Role of Chief Minister – Council of Ministers – State Legislature – Composition, Powers and Functions.


Chapter – 11: Constitutional Provisions for Scheduled Castes and Tribes; Women and Children and Backward Classes.


Chapter – 12: Emergency: Grounds for proclaiming Emergency, kinds & effects of Emergency


UNIT - IV

Chapter – 14: Scope and Aims of Engineering Ethics

Chapter – 15: Responsibility of Engineers – Impediments to Responsibilities

Chapter – 16: Honesty, Integrity and Reliability
TEXT BOOKS:

1. Introduction to the Constitution of India – by Durga Das Basu
2. Engineering Ethics – by Charles E. Harris, Michael S. Pritchard and Michael J. Robins
3. Ethics in Engineering – by Mike W. Martin and Ronald Schinzinger
4. Introduction to Engineering Ethics – by Roland Schinzinger and Mike W. Martin.

REFERENCE BOOKS

1. Constitution of India – by P.M. Bakshi
2. Constitution of India – by B. N. Shukla
3. Introduction to Constitution of India – by M.V. Pylee
4. Introduction to Constitution of India – by Brij Kishore Sharma

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15PH109: ENGINEERING PHYSICS LABORATORY

Sub code : 15PH109
Hrs / Week : 3

No. of Credits : 02
Total Hours : 36

Course Objectives:

1. To educate students in the use of modern engineering and Physics techniques and tools for measurement, data acquisition, interpretation and analysis
2. Provide students with significant hands-on laboratory experiences throughout the curriculum.
3. Expose students to environmental, ethical and contemporary issues, including the historical advancements made in the field of Physics, the innovations they have led to and their societal impact.

Course Outcomes:

Upon completion of a course in Engineering Physics Laboratory, students should be able to demonstrate:

1. An ability to use the techniques, skills, and modern tools necessary for Physics and Engineering careers.
2. An ability to design and conduct experiments, as well as to analyze and interpret data
3. An understanding of professional and ethical responsibility

1. Planck’s constant determination using photoelectric effect
2. I-V characteristics of LED
3. Grating Spectrometer-to find the wavelength of diode laser/LED
4. I-V characteristics of Zener diode
5. Series and parallel resonance in an LCR circuit
6. Ultrasonic Interferometer
7. Hall effect
8. Energy gap of a semiconductor using diode
9. Numerical aperture / Power loss in an optical fibre
10. Photo transistor / transistor characteristics
11. Charging and discharging of a capacitor
12. Solar Cell I-V Characteristics

**REFERENCE BOOKS:**


**SCHEME:**

Minimum ten experiments are to be performed

Candidate has to perform two experiments in S E examination.

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15CY110 - ENGINEERING CHEMISTRY

Sub Code : 15CY110  No. of Crédits : 04
Hrs/ Week : 4  Total Hours : 52

Course Objectives:
1. To make the students to realize the importance of Chemistry in day to day life and professional carrier.
2. To expose the students to all branches of Chemistry (Inorganic, physical, organic and applied chemistry)
3. To impart knowledge on chemistry and its applications in various engineering materials.

Course Outcomes:
1. The students are able to develop knowledge on principles of batteries, corrosion science, fuels, liquid crystals, nanochemistry, polymers, water treatment etc. and it will enable them to distinguish, differentiate, analyze and solve engineering problems.

UNIT - I

Electrochemical cells:

Battery Technology:
Introduction, battery characteristics. Classification of batteries – primary, secondary and reserve batteries. Construction working and applications of Zn-MnO₂, Pb-acid, Nickel-Metal hydride, Lithium-MnO₂, Lithium ion batteries.
Fuel Cells - Introduction, types of fuel cells- Construction, working and uses of H₂-O₂ and Methanol-Oxygen fuel cells. 5 Hours

UNIT - II

Corrosion Science:
Metal Finishing:
Technological importance of metal finishing. Electroplating—Process, Polarization, decomposition potential and over-voltage. Effect of plating variables on the nature of electrodeposit, Electroplating of Cr. Electroless plating – principles, advantages of electroless plating over electroplating. Electroless plating of copper in PCB.

UNIT - III

Chemical Fuels:

Liquid Crystals:

UNIT - IV

Polymer science:

UNIT - V

Water Technology:
Impurities in water, Water analysis for Hardness and Dissolved oxygen.

**Nanochemistry:**
Introduction, Nanoparticles, Classification (Zero dimensional, one dimensional, two dimensional and three dimensional). Synthesis of nano materials by: microwave method, combustion method- Preparation of ZnO nanoparticles by microwave assisted combustion method. Chemical vapour deposition method- synthesis of carbon nano tubes and Sol-gel methods- preparation of metal oxide nanoparticles (Si, Ti, Al and Zr).

**TEXT BOOKS:**

**REFERENCE BOOKS:**
5. Polymer Science by F. W. Billmeyer., John Wiley & Son’s.

**********
UNIT - I

Introducing Computer Systems

The Computer defined, Types of Computers, the parts of a computer system, the information processing cycle, computer hardware, software.

1 Hour

Interacting with Computer


2 Hours

Processing Data

Transforming Data into Information: How computers represent data, How computers process data, factors affecting processing speed, Microcomputer processors, how does a program get executed.

2 Hours

Storing Data

Types of storage devices: primary, secondary devices

1 Hour

Using Operating Systems

Operating system basics- The purpose of operating system, Types of operating system, Examples.
UNIT - II

Algorithms and Flowcharts

Algorithms, Flowcharts, writing algorithms and drawing flowcharts for simple exercises. Programming paradigm: Sequential, procedural Object oriented programming, SDLC 2 Hours

Constants, Variables, and Data Types

Characters set, C tokens, Keywords and identifiers, Constants, Variables, Data Types, and Declaration of Variables. 2 Hours

Operators and Expressions

Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and Decrement operators, conditional operator, Bitwise operators, Special Operators, Arithmetic expressions, Evaluation of expressions, Precedence of Arithmetic operators, Type conversions in expressions, Operator precedence and associativity. 6 Hours

UNIT - III

Programming styles: Commenting, naming conventions and indentation 0.5 Hour

Managing Input and Output Operations

Reading a character, Writing a Character, Formatted Input, Formatted Output 3 Hours

Decision marking and Branching

Decision making with if statement, Simple if Statement, The if…else statement, Nesting of if…else statements, The else…if ladder, The switch statement, The ?: operator, The Goto statement. 3.5 Hours

Decision making and Looping

The while statement, The do statement, The for statement, Jumps in Loops 3 Hours

UNIT - IV

User-defined Functions
Need for User Functions, A multi-function program, Element of User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions.  

**6 Hours**

**Arrays**

One-dimensional Arrays, Declaration of one-dimensional Arrays, Initialization of one-dimensional Arrays, strings, Two-dimensional Arrays, Initializing two-dimensional Arrays, Passing arrays as parameters to functions.  

**6 Hours**

**UNIT - V**

**Structures and Unions**

Defining a structure, Declaration and Accessing structured Variable. Copying and Comparing structured Variable, Arrays of Structures and Simple Programs on structures. Open MP overview, directives, environment variables, few examples.  

**6 Hours**

**Pointers & File handling**

Introduction, Understanding Pointers, Accessing the address of Variables, Declaration pointer variable, pointers and arrays, Simple programs on pointer Usage, opening/closing files, reading/writing from/to sequential files.  

**6 Hours**

**TEXT BOOKS:**


**REFERENCE BOOKS:**

1. Introduction to Computer Science, ITL Education Solutions Ltd., Pearson Education,2004
Course Outcomes (COs):
After studying this subject, student should be able to:

1. Understand the characteristics and working of Semiconductor Diode, and analyze its use in rectification and regulation.
2. Understand the construction, characteristics and different modes of operation of a Bipolar Junction Transistor and other semiconductor devices.
3. Understand the operation and gain-frequency characteristics of RC coupled Amplifier and appreciate its use in various Oscillator circuits.
4. Analyze and design op-amp circuits for basic mathematical operations; understand the working of an oscilloscope for observing signals; appreciate the concept of modulation in radio.
5. Identify different number systems, convert from one base to another base, understand the working of different logic gates and design circuits using the same.

UNIT- I

SEMICONDUCTOR DIODES AND APPLICATIONS:- p-n junction diode, Characteristics and Parameters, Diode approximations, DC load line, Zener Diodes, Half-wave diode rectifier, Ripple factor, Full-wave diode rectifier, Other full-wave circuits, Shunt capacitor - Approximate analysis of capacitor filters, Zener diode voltage regulators, Numerical examples as applicable

10 Hours

UNIT II

TRANSISTORS:- Bipolar Junction transistor, Transistor Voltages and currents, amplification, Common Base, Common Emitter Characteristics, DC Load line and Bias Point, Base Bias.

OTHER DEVICES: - Silicon Controlled Rectifier (S.C.R), SCR Control Circuits and S.C.R applications.

10 Hours

UNIT - III

AMPLIFIERS & OSCILLATORS:- Decibels and Half power points, Single Stage CE Amplifier, Series voltage negative feedback and additional effects of negative feedback (Qualitative discussions only), The Barkhausen Criterion for oscillations, BJT RC phase shift
oscillator, Hartley and Colpitts oscillator (Qualitative discussions only), Numerical problems as applicable.

10 Hours

UNIT - IV

INTRODUCTION TO OPERATIONAL AMPLIFIERS: - Ideal OP-AMP, Saturable property of an OP-AMP inverting, and non inverting OP-AMP circuits, need for OP-AMP, Characteristics and applications – voltage follower, addition, subtraction, integration, differentiation; Cathode Ray Oscilloscope (CRO), applications, Numerical examples as applicable.

COMMUNICATION SYSTEMS: - Block diagram, Modulation (qualitative discussions only) Radio Systems, Superheterodyne Receivers.

10 Hours

UNIT - V

NUMBER SYSTEMS: - Introduction, decimal system, Binary, Octal and Hexadecimal number systems, addition and subtraction, fractional number, Binary Coded Decimal numbers.

DIGITAL LOGIC: - Boolean algebra, Logic gates, Half-adder, Full-adder, Parallel Binary adder. 12 Hrs

TEXTBOOKS:
T1. David A. Bell, Electronic Devices and Circuits, PHI, New Delhi, 2004.

REFERENCE BOOKS:
15CV113 - ENVIRONMENTAL STUDIES

Sub Code: 15CV113
No. of Credits: 01
Hrs/Week: 1
Total Hours: 13

Course Outcomes:

At the end of the course the students will be able to:

1. Identify the significance of environmental practice in their daily life and in the engineering practices
2. Create awareness about environmental conditions
3. Follow environmentally appropriate behavior
4. Understand the importance of their surroundings
5. Understand Current environmental issues of importance

UNIT - I


Human activities: The Anthropo System- activities like growing food, building shelter and some other for economy and social security. Soil erosion, water logging-definition. Organic farming-definition.

3 Hours

UNIT - II


3 Hours

UNIT - III

UNIT - IV


UNIT - V

Current environmental issues of importance:


TEXT BOOKS


REFERENCE BOOKS

-course Objectives:

By the end of the course students should be able to:

1. Understand how to pronounce words, rules of word stress, intonation and organize the matter in casual and formal speech.
2. Understand the process of communication, its types and the barriers.
3. Interpret literary pieces and enhance social values and language skills.
4. Effectively apply the etiquettes of telephone communication.
5. To draft technical communication writings like resume, reports, business letters and know the nuances of personality and leadership.

-course Outcomes:

By the end of the course students will be able to:

1. Comprehend and use the proper usage and pronunciation of English Language
2. Deliver proper communication skills and etiquettes.
3. Appreciate literary pieces for its language and social interpretations.
4. Effectively execute telephone skills and etiquettes.
5. Enhance personality, leadership and managerial skills.

UNIT - I

Introduction to Phonetics 5 Hours

Introduction, Consonant and Vowel Sounds, Syllable structure, Transcription, Word Stress & Rhythm, Weak & Strong Forms, Intonation, Awareness of Different Accents, Dealing with Problem Sounds

Lab Class 3 Hours

Sound Chart, Rules of Word Stress, Weak & Strong Forms, Falling & Rising Tones

UNIT - II
Communication

What is Communication, Process of Communication, Types of Communication (Verbal & Non Verbal, Intra-personal, Interpersonal – Formal/Informal Mass and Organizational Communication), Listening to Announcements

Lab Class

Effective Communication and Barriers, Greeting & Introducing, Making Requests, Asking for & Giving Permission, Offering and Declining Help.

UNIT - III

Language Skills

Prose-02 lessons & Poetry -02 poems; Comprehension, Reading & Writing Skills, Vocabulary, Parts of Speech (Articles, Prepositions, Conjunctions), Subject-Verb Agreement, Question Tag, Synonyms, Antonyms, Prefixes & Suffixes, One-Word Substitutes

Lab Class

English in Mind Modules (Grammar & Vocabulary)

UNIT - IV

Telephone Skills/ Digital Communication

Introduction, Types of Calls, Handling Calls, Leaving Messages, Making Requests, Making & Handling Complaints, Telephone Etiquette.

Lab Class (Oral Communication Skills)

Handling Calls, Leaving Messages, Making Requests, Making & Handling Complaints, Telephone Etiquette.

UNIT - V

Correspondence Skills/Professional Skills

Resume, Types of Letter Formats, Cover-letters, Meeting, Short Formal Speech

Personality -Term, Types, Significance, Body Language

Leadership -Qualities of a Successful Leader, Difference between Leader & Manager

Lab Class (Oral Communication Skills)
TEXT BOOK:

1. Customized Reference Material on English & Communication Skills

REFERENCE BOOKS:


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15ME115 - COMPUTER AIDED ENGINEERING GRAPHICS

Sub Code : 15ME115  No. of Credits : 03
Hrs/Week : 4  Total Hours : 45

Course Outcomes

At the end of the course the student should be able to

1. Understand the basics of orthographic projection and fundamental concepts of four quadrants of projection system
2. Know the projection of different plane surfaces in different positions
3. Understand the projection of different solid objects in different positions
4. Draw the development of lateral surfaces of solid objects and its use in sheet metal development
5. Draw the isometric projection of solid objects and differentiating it from orthographic projection
6. Understand the use of drafting software for executing the above drafting exercises

UNIT - I

Orthographic Projection  9 Hours

Orthographic Projection: Planes of Projection, First angle projection, reference line. Conventions employed for drawing, Projection of points located in first, second, third and fourth quadrants, Projection of Lines (First angle projection only), True and apparent lengths, true and apparent inclinations.

UNIT - II
Projection of Plane surfaces 9 Hours

Projection of plane surface: Triangle, Square, Rectangle, Pentagon and Hexagon in different positions.

UNIT - III

Projection of Solids 12 Hours

Projection of right regular solids: Prisms, Pyramids, Cones and Cylinders in different positions.

UNIT - IV

Development of Lateral surfaces of solids 6 Hours

Development of lateral surfaces of: Right regular Prisms, Pyramids, Cylinders and cones and their frustums.

Isometric projection and Isometric view 9 Hours

Isometric scale, Difference between Isometric projection and isometric view: To draw Isometric views of simple solids and machine components using their orthographic projections.

TEXT BOOKS:


REFERENCE BOOKS:


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15CS116 - COMPUTER CONCEPTS AND C PROGRAMMING LAB

Sub Code : 15CS116  No. of Credits : 02
Hrs/Week : 3  Total Hours : 26
PART A : Low Complexity Programs:

1. Write a C program to find the roots of a quadratic equation \( ax^2 + bx + c = 0 \)
2. Write a C program to find the factorial of a given number \( N \).
3. Write a C program to find the sum of all the digits and occurrence of a digit in the number.
4. Write a C program to find if a given number is prime or not.
5. Write a C program to find the GCD and LCM of given two numbers using Euclid’s method.
6. Write a C program to print the prime numbers in a given range.
7. Write a C program to print the Fibonacci series.
8. Write a C program to find if a given string is a palindrome or not.
9. Write a C program to input \( N \) real numbers in 1-D array. Compute mean, variance and Standard Deviation. Mean = \( \frac{\sum \text{of elements}}{N} \), Variance = \( \frac{\sum (X_i - \text{mean})^2}{N} \), STD Deviation = \( \sqrt{\text{variance}} \).
10. Write a C program to read \( N \) integers into an array \( A \) and find the sum of elements using pointers.
11. Write a C program to copy contents of one file to another file.

PART B : High Complexity Programs:

1. Write a C program to perform a binary search for a given key integer in a single dimensional array of numbers in ascending order and report success or failure in the form of a suitable message.
2. Write a C program to input \( N \) integer numbers into a single dimension array, sort them in to ascending order using selection sort technique, and then to print both the given array and the sorted array with suitable headings.
3. Write a C program to transpose a matrix of order \( M \times N \) and find the trace of the resultant matrix.
4. Write a C program using functions to read two matrices \( A \ (M \times N) \) and \( B \ (P \times Q) \) and to compute the product of \( A \) and \( B \) if the matrices are compatible for multiplication.
5. Write a C program using functions readmat ( ), rowsum ( ), colsum ( ), totsum ( ) and printmat( ) to read the values into a two dimensional array \( A \), find the sum of all the elements of a row, sum of all the elements of a column, find the total sum of all the elements of the two dimensional array \( A \) and print the results.
6. Write a C program to perform a linear search for a given key integer in a single dimensional array of numbers and report success or failure in the form of a suitable message using functions.
7. Write a C program to enter the information like name, register number, marks in 6 subjects of \( N \) libbooksents into an array of structures, find the average & display grade based on average for each libbooksent.

Average Grade
80 -100 Distinction
60-79 First Class
40 -59 Second Class
<40 Fail

8. Write a C program to enter the information like book name, book id, author, price of
of N books into an array of structures, search for a particular book based on the book id
using function and display the details.

9. Write a C program to enter the information like book name, book id, author, price of
of N books into an array of structures, search for a particular book based on the book id
using function and display the details.

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15CY117 - ENGINEERING CHEMISTRY LABORATORY

Sub Code : 15CY117  No. of Credits : 02
Hrs / Week : 3  Total Hours : 36

Course Objectives:
1. To make the students to realize the importance of Chemistry in day to day life and
professional carrier.
2. To expose the students to all branches of Chemistry (Inorganic, physical, organic and
applied chemistry)
3. To impart knowledge on chemistry and its applications in various engineering materials.

Course Outcome:
1. The students are able to develop knowledge on principles of batteries, corrosion science,
fuels, liquid crystals, nanochemistry, polymers, water treatment etc. and it will enable
them to distinguish, differentiate, analyze and solve engineering problems.

PART – A
Volumetric analysis
1. Determination of Total Hardness of a sample of water using disodium salt of EDTA.
2. Determination of percentage of Copper in brass using standard sodium thiosulphate
solution.
3. Determination of Iron in the given sample of Haematite ore solution using potassium
dichromate crystals.
4. Determination of manganese dioxide in pyrolusite using standard potassium
permanganate solution.
5. Determination of Chemical Oxygen Demand (COD) of the given industrial waste Water sample.
6. Determination of nitrogen ammonia in a given sample of fertilizer using standard hydrochloric acid solution.

**PART – B**

**Instrumental analysis**

1. Potentiometric estimation of FAS using standard K₂Cr₂O₇ solution.
2. Colorimetric determination of iron.
5. Determination of viscosity coefficient of a given liquid using Ostwald’s viscometer.
6. Flame photometric estimation of sodium in the given sample of water.

**REFERENCE BOOKS:**


**Scheme of Examination:**

One experiment from Part-A and another from Part-B shall be set.

In given batch a common experiment shall be set under Part-A and different experiments under Part-B.

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**15 MA201 - ENGINEERING MATHEMATICS-II**

<table>
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<th>15 MA201</th>
<th>No. of Credits</th>
<th>04</th>
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<tbody>
<tr>
<td>Hrs/Week</td>
<td>4</td>
<td>Total Hours</td>
<td>52</td>
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**Course Outcome:**

At the end of the course the student will be able to

1. Use ordinary differential equations to model engineering problems such as electrical circuits, heat transfer, laws of decay and growth etc.
2. Learn different methods to solve differential equations.
3. Understand the concept of Laplace Transformation and to use this technique to obtain the solutions of initial value problems.
4. Generalizing the concept of definite integrals into multiple integrals and to evaluate them.
5. Use partial differential equations to model problems in fluid mechanics and heat transfer etc.

UNIT - I

**Differential Equations:** Introduction to first order and first degree differential equations. Exact, reducible to exact and Bernoulli’s differential equations, equations. Orthogonal trajectories of cartesian and polar curves. Applications to engineering- Newton’s law of cooling, flow of electricity, laws of decay and growth etc.

Nonlinear first order differential equations- equations solvable for p, y and x. General and singular solutions. Clairaut’s equations and equations reducible to Clairaut’s form. 10 Hours

UNIT - II

**Linear Differential equations:** Second and higher order linear differential equations with constant coefficients-solution by inverse differential operator method, method of undetermined coefficients. method of variation of parameters.

Linear differential equations with variable coefficients- solution of Cauchy’s and Legendre’s linear differential equations. Solution of Cauchy’s homogeneous linear equations. Applications to engineering problems. 10 Hours

UNIT - III

**Integral Calculus:** Differentiation under integral sign (Integrals with constant and variable limits). Multiple Integral:- Evaluation by change of order of integration – change of variables and applications to area and volume. Beta and Gamma functions. 11 Hours

UNIT - IV

**Laplace Transforms:**

Definitions, Transforms of elementary functions- Transforms of derivatives and integrals-properties. Periodic functions, Unit Step functions and Unit Impulse functions.

Inverse Transforms- Properties Convolution Theorem. Initial & Final value theorems. Solutions of linear differential equations. Applications to Engineering problems. 12 Hours
UNIT - V

Partial differential equations: Formation of partial differential equations by elimination of arbitrary constants/ arbitrary functions. Derivation of one dimensional heat and wave equations, Solution of PDEs by direct integration, by the method of separation of variables, by Lagrange’s method. 9 Hours

TEXT BOOKS:


REFERENCE BOOKS:


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15BT120 - BIOLOGY FOR ENGINEERS

Subject code : 15BT120 No. of Credits : Nil
Hrs/Week : 2 Total Hours : 26

Course Objectives:
To understand and integrate unique biological principles in engineering to improve present technologies. To apply biologically-inspired principles and designs to develop solutions for engineering problems.

Course Outcomes:
At the end of the course the student will be able to
1. Draw inspirations from biological principles to solve engineering problems.
2. Understand concept of energy and energy conservation through biological system.
3. Apply biomechanics to develop engineering technologies.

UNIT – I

MEMBRANE BIOLOGY AND ENGINEERING PRINCIPLES: Architecture of cell membrane, passage of water through membrane, maintenance of osmotic balance, bulk passage

UNIT – II

BIOLOGICAL THERMODYNAMICS: What is energy? Kinetic and potential energy, the oxidation reduction, the flow of energy in living systems, the laws of thermodynamics and thermodynamics of living system. Activation energy, enzymes as catalyst to decrease activation energy. System and surroundings. Enthalpy of biological system, second law of thermodynamics and entropy of biological system, Gibbs free energy, protein and DNA structure as an examples for thermodynamic principles. Equilibrium phenomena, dialysis, protein and DNA denaturation, membrane transport, non-equilibrium thermodynamics and life. 8 Hours

UNIT - III


REFERENCE BOOKS:

Examination:

This course is a mandatory learning course without credit for students of all streams of engineering in the first year. Continuous internal examination (CIE) consists of 2 internal exams (20 marks each) and tasks (10 marks). There is no semester end examination (SEE). The student will be awarded PP or NP grade as per autonomous regulations.