

## ENGINEERING MATHEMATICS – I

<b>Sub Code</b>	<b>:</b>	<b>10MAT11</b>	<b>IA Marks</b>	<b>:</b>	<b>25</b>
<b>Hrs/ Week</b>	<b>:</b>	<b>04</b>	<b>Exam Hours</b>	<b>:</b>	<b>03</b>
<b>Total Hrs.</b>	<b>:</b>	<b>52</b>	<b>Exam Marks</b>	<b>:</b>	<b>100</b>

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### PART-A

#### UNIT – 1

##### Differential Calculus - 1

Determination of  $n^{\text{th}}$  derivative of standard functions-illustrative examples\*. Leibnitz's theorem (without proof) and problems.

Rolle's Theorem – Geometrical interpretation. Lagrange's and Cauchy's mean value theorems. Taylor's and Maclaurin's series expansions of function of one variable (without proof).

**6 Hours**

#### UNIT – 2

##### Differential Calculus - 2

Indeterminate forms – L'Hospital's rule (without proof), Polar curves: Angle between polar curves, Pedal equation for polar curves. Derivative of arc length – concept and formulae without proof. Radius of curvature - Cartesian, parametric, polar and pedal forms.

**7 Hours**

#### UNIT – 3

##### Differential Calculus - 3

Partial differentiation: Partial derivatives, total derivative and chain rule, Jacobians-direct evaluation.

Taylor's expansion of a function of two variables-illustrative examples\*. Maxima and Minima for function of two variables. Applications – Errors and approximations.

**6 Hours**

#### UNIT – 4

##### Vector Calculus

Scalar and vector point functions – Gradient, Divergence, Curl, Laplacian, Solenoidal and Irrotational vectors.

Vector Identities:  $\text{div}(\nabla A)$ ,  $\text{Curl}(\nabla A)$ ,  $\text{Curl}(\text{grad } \phi)$ ,  $\text{div}(\text{Curl} A)$ ,  $\text{div}(A \times B)$  &  $\text{Curl}(\text{Curl} A)$ .

Orthogonal Curvilinear Coordinates – Definition, unit vectors, scale factors, orthogonality of Cylindrical and Spherical Systems. Expression for Gradient, Divergence, Curl, Laplacian in an orthogonal system and also in Cartesian, Cylindrical and Spherical System as particular cases – No problems

**7 Hours**

## PART-B

### UNIT – V

#### Integral Calculus

Differentiation under the integral sign – simple problems with constant limits. Reduction formulae for the integrals of  $\sin^n x$ ,  $\cos^n x$ ,  $\sin^m x \cos^n x$  and evaluation of these integrals with standard limits - Problems.

Tracing of curves in Cartesian, Parametric and polar forms – illustrative examples\*. Applications – Area, Perimeter, surface area and volume.

Computation of these in respect of the curves – (i) Astroid:  $x^{2/3} + y^{2/3} = a^{2/3}$   
(ii) Cycloid:  $x = a(\theta - \sin \theta)$ ,  $y = a(1 - \cos \theta)$  and (iii) Cardioid:  
 $r = a(1 + \cos \theta)$

**6 Hours**

### UNIT – VI

#### Differential Equations

Solution of first order and first degree equations: Recapitulation of the method of separation of variables with illustrative examples\*. Homogeneous, Exact, Linear equations and reducible to these forms. Applications - orthogonal trajectories.

**7 Hours**

### UNIT – VII

#### Linear Algebra-1

Recapitulation of Matrix theory. Elementary transformations, Reduction of the given matrix to echelon and normal forms, Rank of a matrix, consistency of a system of linear equations and solution. Solution of a system of linear homogeneous equations (trivial and non-trivial solutions). Solution of a system of non-homogeneous equations by Gauss elimination and Gauss – Jordan methods.

**6 Hours**

### UNIT – VIII:

#### Linear Algebra -2

Linear transformations, Eigen values and eigen vectors of a square matrix, Similarity of matrices, Reduction to diagonal form, Quadratic forms, Reduction of quadratic form into canonical form, Nature of quadratic forms

**7 Hours**

**Note: \* In the case of illustrative examples, questions are not to be set.**

**Text Books:**

1. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers
2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

**Reference Books:**

1. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
2. Peter V. O'Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd. Publishers

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## ENGINEERING PHYSICS

Sub Code	: 10PHY12/10PHY22	IA Marks	: 25
Hrs/ Week	: 04	Exam Hours	: 03
Total Hrs.	: 52	Exam Marks	: 100

### PART – A

#### UNIT-1

##### Modern Physics

Introduction to Blackbody radiation spectrum, Photo-electric effect, Compton effect. Wave particle Dualism. de Broglie hypothesis – de Broglie wavelength, extension to electron particle. – Davisson 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 deBroglie wavelength using group velocity.

**7 Hours**

#### UNIT-2

##### Quantum Mechanics

Heisenberg's uncertainty principle and its physical significance. Application of uncertainty principle (Non-existence of electron in the nucleus, Explanation for  $\beta$ -decay and kinetic energy of electron in an atom). Wave function. Properties and Physical significance of a wave function. Probability density and Normalisation of wave function. Setting up of a one dimensional, time independent Schrödinger wave equation. Eigen values and Eigen functions. Application of Schrödinger wave equation – Energy Eigen values for a free particle. Energy Eigen values of a particle in a potential well of infinite depth.

**6 Hours**

#### UNIT-3

##### Electrical Conductivity in Metals

Free-electron concept. Classical free-electron theory - Assumptions. Drift velocity. Mean collision time and mean free path. Relaxation time. Expression for drift velocity. Expression for electrical conductivity in metals. Effect of impurity and temperature on electrical resistivity of metals. Failures of classical free-electron theory.

Quantum free-electron theory - Assumptions. Fermi - Dirac Statistics. Fermi-energy – Fermi factor. Density of states (No derivation). Expression for electrical resistivity / conductivity. Temperature dependence of resistivity of metals. Merits of Quantum free – electron theory.

**7 Hours**

#### **UNIT-4**

##### **Dielectric & Magnetic Properties of Materials**

Dielectric constant and polarisation of dielectric materials. Types of polarisation. Equation for internal field in liquids and solids (one dimensional). Clausius – Mossotti equation. Ferro and Piezo – electricity (qualitative). Frequency dependence of dielectric constant. Important applications of dielectric materials. Classification of dia, para and ferromagnetic materials. Hysteresis in ferromagnetic materials. Soft and Hard magnetic materials. Applications.

**7 Hours**

#### **PART – B**

#### **UNIT - 5**

##### **Lasers**

Principle and production. Einstein's coefficients (expression for energy density). Requisites of a Laser system. Condition for Laser action. Principle, Construction and working of He-Ne and semiconductor Laser. Applications of Laser – Laser welding, cutting and drilling. Measurement of atmospheric pollutants. Holography – Principle of Recording and reconstruction of 3-D images. Selected applications of holography.

**6 Hours**

#### **UNIT-6**

##### **Optical Fibers & Superconductivity**

Propagation mechanism in optical fibers. Angle of acceptance. Numerical aperture. Types of optical fibers and modes of propagation. Attenuation. Applications – block diagram discussion of point to point communication.

Temperature dependence of resistivity in superconducting materials. Effect of magnetic field (Meissner effect). Type I and Type II superconductors - Temperature dependence of critical field. BCS theory (qualitative). High temperature superconductors. Applications of superconductors – Superconducting magnets, Maglev vehicles and squids

**7 Hours**

#### **UNIT-7**

##### **Crystal Structure**

Space lattice, Bravais lattice - unit cell, primitive cell. Lattice parameters. Crystal systems. Direction and planes in a crystal. Miller indices. Expression for inter-planar spacing. Co-ordination number. Atomic packing factor. Bragg's Law. Determination of crystal structure by Bragg's x-ray spectrometer. Crystal structures of NaCl, and diamond.

**6 Hours**

**UNIT-8****Material Science**

Introduction to Nanoscience and Nanotechnology. Nanomaterials: Shapes of nanomaterials, Methods of preparation of nanomaterials, Wonders of nanotechnology: Discovery of Fullerene and carbon nanotubes, Applications. Ultrasonic non-destructive testing of materials. Measurements of velocity in solids and liquids, Elastic constants.

**6 Hours****Text Books**

	<b>Title</b>		<b>Author/s / Editor</b>		<b>Publishers</b>
<b>1</b>	<b>Solid State Physics – Sixth Edition</b>	-	S.O. Pillai	-	New Age International
<b>2</b>	<b>Engineering Physics</b>	-	V. Rajendran	-	Tata Mc-Graw Hill Company Ltd., New Delhi

**Reference Books**

	<b>Title</b>		<b>Author/s / Editor</b>		<b>Publishers</b>
<b>1</b>	<b>Nanosystems- Molecular Machinery, Manufacturing and Computation</b>	-	K.Eric Drexler	-	John Wiley & Sons 2005 Ed.
<b>2</b>	<b>Fundamentals and Applications of Ultrasonic Waves</b>	-	J David N Cheeke and Cheeke N Cheeke	-	CRC Press
<b>3</b>	<b>Nano Materials</b>	-	Vishwanathan	-	Narosa Publications
<b>4</b>	<b>Engineering Physics</b>	-	G.K Shivakumar	-	Prism Books Pvt. Ltd.

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## ENGINEERING CHEMISTRY

Sub Code	: 10CHE12/ 10CHE 22	IA Marks	: 25
Hrs/ Week	: 04	Exam Hours	: 03
Total Hrs.	: 52	Exam Marks	: 100

### PART – A

#### UNIT – 1

##### Electrode Potential and Cells

Introduction, Differences between galvanic and electrolytic cells, Construction of galvanic cell, EMF of a cell, Origin of single electrode potential, Sign convention and cell notation, Standard electrode potential, Derivation of Nernst equation for single electrode potential.

Types of electrodes: Reference electrodes – Primary and secondary, Limitations of standard hydrogen electrode, Construction and working of calomel electrode and Ag – AgCl electrode, Measurement of single electrode potential, Numerical problems on electrode potential and EMF of a cell, Ion selective electrode: Glass electrode – Construction, Determination of pH of a solution using glass electrode, concentration cells, numerical problems.

**7 Hours**

#### UNIT - 2

##### Batteries and Fuel Cells

Basic concepts, Battery characteristics – primary, secondary and reserve batteries with examples, super capacitors

Classical batteries: Construction, working and applications of Zn – MnO<sub>2</sub>, Lead acid storage and Ni – Cd batteries.

Modern batteries: Construction, working and applications of Zn – air, Ni – metal hydride and Li – MnO<sub>2</sub> batteries.

Fuel cells – Differences between battery and fuel cell, construction and working of H<sub>2</sub> – O<sub>2</sub> and CH<sub>3</sub>OH – O<sub>2</sub> fuel cells.

**6 Hours**

#### UNIT - 3

##### Corrosion and its control

Electrochemical theory of corrosion, Galvanic series, Types of corrosion- Differential metal corrosion, Differential aeration corrosion (Pitting and water line corrosion), Stress corrosion (caustic embrittlement in boilers), Factors affecting the rate of corrosion

Corrosion control: Inorganic coatings – Anodizing and phosphating, Metal coatings – Galvanizing and Tinning, Corrosion inhibitors, cathodic protection.

**7 Hours**

#### **UNIT - 4**

##### **Metal Finishing**

Technological importance, Significance of Polarization, Decomposition potential and Overvoltage in electroplating, Theory of electroplating. Effect of plating variables on the nature of electrodeposit- Electroplating process, Electroplating of gold and Chromium.

Distinction between electroplating and electrolessplating, Electrolessplating of copper and nickel.

**6 Hours**

#### **PART – B**

#### **UNIT – 5**

##### **Chemical fuels and Photovoltaic cells**

Introduction, Classification of chemical fuels Calorific value – High and Low calorific values, Determination of calorific value –solid or liquid fuel using Bomb calorimeter - numerical problems .

Petroleum – Cracking by fluidized catalytic cracking process, Reformation of petrol, Octane and Cetane numbers. Knocking – mechanism and harmful effects. Antiknocking agents – TEL, Catalytic converters – Principle and working, Unleaded petrol, Power alcohol and Biodiesel.

Photovoltaic cells – Production of solar grade silicon, Doping of silicon, Construction and working of photovoltaic cell, Advantages.

**7 Hours**

#### **UNIT – 6**

##### **The Phase rule and Instrumental methods of analysis**

Statement of Gibb's phase rule and explanation of the terms involved, Phase diagram of one component system – water system, Condensed phase rule , Phase diagram of two component system- Eutectic Pb – Ag system and Fe – C system. Application – Desilverization of lead.

Instrumental methods of analysis- Theory , Instrumentation and applications of Colorimetry, Potentiometry , Conductometry and Flame photometry.

**6 Hours**

#### **UNIT - 7**

##### **Polymers**

Types of polymerization – Addition and Condensation, Mechanism of polymerization – Free radical mechanism taking ethylene as example. Glass transition temperature (  $T_g$  ) , Structure – property relationship. Types of plastics – Thermosetting and thermoplastics. Manufacture of plastics by compression ,injection and extrusion moulding.

Synthesis and applications of Teflon, PMMA, Polyurethane and Phenol – formaldehyde resins.

Elastomers: Deficiencies of natural rubber, Vulcanization of rubber.  
Synthesis and applications of Neoprene and Butyl rubber, Silicone rubbers.  
Adhesives: Synthesis and applications of epoxy resins.  
Polymer composites - Synthesis and applications of Kevlar and Carbon fibers.  
Conducting polymers – Definition, Mechanism of conduction in Polyacetylene, applications.

**7 Hours**

#### **UNIT - 8**

##### **Water Chemistry**

Impurities in water ,Water analysis – Determination of different constituents in water – Hardness, alkalinity, chloride , fluoride , nitrate , sulphate and dissolved oxygen. Numerical problems on hardness and alkalinity. Sewage – BOD and COD, Numerical problems, Sewage treatment. Desalination of water – Reverse Osmosis and Electrodialysis

**6 Hours**

##### **Text Books:**

1. Chemistry for Engineering students by B.S. Jai Prakash, R.Venugopal, Sivakumaraiah and Pushpa Iyengar
2. Engineering Chemistry by O.G. Palanna, Tata McGraw Hill Publishing Pvt.Ltd. New Delhi 2009

##### **Reference Books:**

1. Principles of Physical Chemistry B.R. Puri , L.R.Sharma & M.S. Pathania, S. Nagin chand and Co.
2. A text book of Engineering Chemistry P.C. Jain and Monica Jain Dhanpatrai Publications , New Delhi.
- 1 Corrosion Engineering M.G. Fontana Mc. Graw Hill Publications.
- 2 Chemistry in Engineering and Technology (Vol. 1 &2) J.C. Kuriacose and J. Rajaram.
- 3 Polymer Science V.R. Gowariker , Wiley Eastern Ltd.

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**ELEMENTS OF CIVIL ENGINEERING & ENGINEERING  
MECHANICS**

<b>Sub Code</b> :	<b>10CIV13/10CIV23</b>	<b>IA Marks</b> :	<b>25</b>
<b>Hrs/ Week</b> :	<b>04</b>	<b>Exam Hours</b> :	<b>03</b>
<b>Total Hrs.</b> :	<b>52</b>	<b>Exam Marks</b> :	<b>100</b>

**PART - A**

**UNIT-1**

1. Introduction to Civil Engineering, Scope of different fields of Civil Engineering - Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering.

Infrastructure: Types of infrastructure, Role of Civil Engineer in the Infrastructural Development, Effect of the infrastructural facilities on socio-economic development of a country.

**4 Hours**

2. Roads: Type of roads, Components and their functions.

**2 Hours**

3. Bridges and Dams: Different types with simple sketches.

**1 Hour**

**UNIT -2**

4. Introduction to Engineering mechanics: Basic idealisations - Particle, Continuum and Rigid body; Force and its characteristics, types of forces, Classification of force systems; Principle of physical independence of forces, Principle of superposition of forces, Principle of transmissibility of forces; Newton's laws of motion, Introduction to SI units, Moment of a force, couple, moment of a couple, characteristics of couple, Equivalent force - couple system; Resolution of forces, composition of forces; Numerical problems on moment of forces and couples, on equivalent force - couple system.

**7 Hours**

**UNIT -3**

5. 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 Hours**

6. Composition of coplanar - non-concurrent force system, Varignon's principle of moments; Numerical problems on composition of coplanar non-concurrent force systems.

**5 Hours**

**UNIT -4**

7. Centroid of plane figures; Locating the centroid of triangle, semicircle, quadrant of a circle and sector of a circle using method of integration, Centroid of simple built up sections; Numerical problems.

**6 Hours**

**PART - B**

**UNIT -5**

8. Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami's theorem; Numerical problems on equilibrium of coplanar – concurrent and non concurrent force systems.

**6 Hours**

**UNIT -6**

9. Types of supports, statically determinate beams, Numerical problems on support reactions for statically determinate beams and analysis of simple trusses (Method of joints and method of sections).

**6 Hours**

**UNIT -7**

10. Friction - Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; Impending motion on horizontal and inclined planes; Wedge friction; Ladder friction; Numerical problems.

**6 Hours**

**UNIT -8**

11. 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, circular and triangular areas from method of integration; Moment of inertia of composite areas; Numerical problems.

**6 Hours**

**Text Books:**

1. Engineering Mechanics by S.Timoshenko,D.H.Young, and J.V.Rao TATA McGraw-Hill Book Company, New Delhi
2. Elements of Civil Engineering (IV Edition) by S.S. Bhavikatti, New Age International Publisher, New Delhi, 3<sup>rd</sup> edition 2009.
3. Elements of Civil Engineering and Engineering Mechanics by M.N.Sheshaprakash and G.B.Mogaveer PHI Learning (2009)

**Reference Books:**

1. Engineering Mechanics B.Bhattacharyya, Oxford University Press 2008
2. Engineering Mechanics by K.L. Kumar, Tata McGraw-Hill Publishing Company, New Delhi.
3. Engineering Mechanics by MVS Rao and D.R.Durgaiah. University Press (2005)
4. Engineering Mechanics by Nelson, Tata McGraw Hill Edn. India Pvt Ltd.
5. Fundamentals of Engineering Mechanics Ali Hassan and Khan , Acme Learning Pvt Ltd.

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## COMPUTER CONCEPTS AND C PROGRAMMING

<b>Subject Code</b>	<b>: 10CCP13/10CCP23</b>	<b>IA Marks</b>	<b>: 25</b>
<b>Hrs/Week</b>	<b>: 04</b>	<b>Exam Hours</b>	<b>: 03</b>
<b>Total Hrs.</b>	<b>: 52</b>	<b>Exam Marks</b>	<b>: 100</b>

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### PART – A

#### UNIT-1

##### **Introduction to Computer Systems, Interacting with the Computer, Computer Organization**

The Computer defined, Early history, Basic parts and structure of a computer, Categorizing Computers, Information Processing life cycle, Essential computer hardware, Essential computer software.

Keyboard, Mouse, Inputting data in other ways: Pen-based systems, Data scanning devices, Game controllers, Voice recognition devices, Microphone, Visual input devices, Video and sound, Monitors, Printers, Plotters, Data projectors, Sound systems. Number systems, ASCII, BCD, CPU, Buses, Mother Board, Chip sets, Microprocessors.

**7 Hours**

#### UNIT-2

##### **Storage Device Concepts, Operating Systems, Networking**

Storage media, Floppy drive, Hard disks, Optical media, CD-ROM, CD-R, CD-RW, DVD-ROM, Recordable DVD.

Software, Custom-made Software, Shrunken-wrapped software, Types of operating systems, Computer processing techniques, Functions of Operating Systems, Management of processor, Memory, Virtual storage, devices, and information.

Networking, Convergence of computing with communications, Networking basics, Need for networking, Basic components of a network.

**7 Hours**

#### UNIT-3

##### **Fundamentals of Problem Solving, Introduction to C Language**

Creating and running programs, System development, Software Engineering.

Introduction to C Language: Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Programming example, Software Engineering, Tips and common programming errors.

**6 Hours**

#### **UNIT-4**

##### **Structure of a C Program**

Expressions, Precedence and associativity, Side effects, Evaluating expressions, Type conversion, Statements, Programming examples, Software Engineering, Tips and common programming errors.

**6 Hours**

#### **PART - B**

#### **UNIT-5**

##### **Functions**

Designing structured programs, Functions in C, User-defined Functions, Inter-function communication, Standard functions, Scope, Programming examples, Software Engineering, Tips and common programming errors.

**6 Hours**

#### **UNIT-6**

##### **Selection – Making Decisions, Repetition**

Logical data and operators, Two-way selection, Multiway-selection, Concept of a loop, pre-test and post-test loops, Initialization and updating, Event controlled and count controlled loops, Loops in C, Other statements related to looping, looping applications, Recursion, Programming examples, Software Engineering, Tips and common programming errors.

**7 Hours**

#### **UNIT-7**

##### **Arrays, Strings**

Concepts, Using arrays in C, Inter-function communication, Array applications, Bubble Sort, Binary search, Two-dimensional Arrays, Multi-dimensional arrays, String concepts, C strings, String input/output, Programming examples, Software Engineering, Tips and common programming errors.

**7 Hours**

#### **UNIT-8**

##### **Basic Concepts of Parallel Programming**

Motivating parallelism, Scope for parallel computing, Thread basics, Why threads? OpenMP: A standard for directive – based parallel programming, The OpenMP programming model, Specifying concurrent tasks in OpenMP, Synchronization constructs in OpenMP, Data handling in OpenMP, OpenMP library functions, Environment variables in OpenMP.

**6 Hours**

**Text Books:**

1. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press/Wiley India, 2009.
2. Behrouz A. Forouzan, Richard F. Gilberg: Computer Science - A Structured Approach Using C, 3<sup>rd</sup> Edition, Cengage Learning, 2007.
3. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar: Introduction to Parallel Computing, 2<sup>nd</sup> Edition, Pearson Education, 2003.

**Reference Books:**

1. Peter Norton: Introduction to Computers, 7<sup>th</sup> Edition, Tata McGraw Hill, 2010.
2. E. Balagurusamy: Programming in ANSI C, 4<sup>th</sup> Edition, Tata McGraw Hill, 2008.
3. Brian W. Kernighan and Dennis Ritchie: The C Programming Language, 2<sup>nd</sup> Edition, PHI, 1998.

**Web Reference:** <http://elearning.vtu.ac.in>

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## ELEMENTS OF MECHANICAL ENGINEERING

<b>Sub Code</b>	<b>: 10EME14 / 10EME24</b>	<b>IA Marks</b>	<b>:</b>	<b>25</b>
<b>Hrs/ Week</b>	<b>: 04</b>	<b>Exam Hours</b>	<b>:</b>	<b>03</b>
<b>Total Hrs.</b>	<b>: 52</b>	<b>Exam Marks</b>	<b>:</b>	<b>100</b>

### PART – A

#### UNIT-1

##### **Energy and Steam**

Forms, Sources and Classification of energy. Utilization of energy with simple block diagrams. Steam formation. Types of steam. Steam properties – Specific Volume, Enthalpy and Internal energy. (simple numerical problems) Steam boilers – classification, Lancashire boiler, Babcock and Wilcox boiler, Boiler mountings, Accessories, their locations and applications. (No sketches for mountings and accessories)

**7 Hours**

#### UNIT-2

##### **Turbines**

**Steam turbines** – Classification, Principle of operation of Impulse and reaction. Delaval's turbine, Parson's turbine. 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 Pelton wheel, Francis turbine and Kaplan turbine

**7 Hours**

#### UNIT-3

##### **Internal Combustion Engines**

Classification, I.C. Engines parts, 2/4 – Stroke Petrol and 4-stroke 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.

**6 Hours**

#### UNIT-4

##### **Refrigeration and Air conditioning**

Refrigerants, Properties of refrigerants, List of commonly used refrigerants. Refrigeration - Definitions - Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, Relative COP, Unit of Refrigeration. Principle and working of vapor compression refrigeration and vapor absorption refrigeration. Principles and applications of air conditioners, Room air conditioner.

**6 Hours**

## PART – B

### UNIT-5

#### **Lathe and Drilling Machines**

**Lathe** - Principle of working of a centre lathe. Parts of a lathe. Operations on lathe - Turning, Facing, Knurling, Thread Cutting, Drilling, Taper turning by Tailstock offset method and Compound slide swiveling method, Specification of Lathe.

**Drilling Machine** – Principle of working and classification of drilling machines. bench drilling Machine, Radial drilling machine. Operations on drilling machine -Drilling, Boring, Reaming, Tapping, Counter sinking, Counter boring and Spot facing. Specification of radial drilling machine.

**7 Hours**

### UNIT-6

#### **Milling and Grinding Machines**

**Milling Machine** – Principle of milling, Types of milling machines. Principle & working of horizontal and vertical milling machines. Milling Processes - Plane milling, End milling, Slot milling, Angular milling, Form milling, Straddle milling and Gang milling. Specification of universal milling machine.

**Grinding Machine** – Principle and classification of Grinding Machines. Abrasives- Definition, Types and applications. Bonding materials. Type of Grinding machines, Principle and working of surface grinding, Cylindrical grinding and Centerless grinding.

**7 Hours**

### UNIT-7

#### **Joining Processes, Lubrication and Bearings**

##### **Soldering, Brazing and Welding**

Definitions. Classification and method of Soldering, Brazing and welding and differences. Brief description of arc welding and Oxy-Acetylene welding

##### **Lubrication and Bearings**

Lubricants-Classification and properties. Screwcap, Tell-Tale, Drop feed, Wick feed and Needle lubricators. Ring, Splash and Full pressure lubrication. Classification of bearings, Bushed bearing, Pedestal bearing, Pivot bearing, Collar bearings and Antifriction bearings.

**6 Hours**

## **UNIT-8**

### **Power Transmission**

**Belt Drives** - Classification and applications, Derivations on length of belt.

Definitions - Velocity ratio, Creep and slip, Idler pulley, stepped pulley and fast & loose pulley.

**Gears** - Definitions, Terminology, Types and uses. Gear drives and

**Gear Trains** – Definitions and classifications, Simple problems.

**6 Hours**

#### **Text Books:**

1. A Text Book of Elements of Mechanical Engineering - S. Trymbaka Murthy, 3<sup>rd</sup> revised edition 2006, I .K. International Publishing House Pvt. Ltd., New Delhi.

#### **Reference Books:**

1. A Text Book of Elements of Mechanical Engineering –K.R. Gopalkrishna, Subhash Publishers, Bangalore.
2. The Elements of Workshop Technology - Vol I & II , SKH Chowdhary, AKH Chowdhary , Nirjhar Roy, 11<sup>th</sup> edition 2001, Media Promotors and Publishers, Mumbai.
3. Elements of Mechanical Engineering –Dr.A.S.Ravindra, Best Publications, 7<sup>th</sup> edition 2009.

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## COMPUTER AIDED ENGINEERING DRAWING

<b>Sub Code</b>	<b>: 10CED14 / 10CED24</b>	<b>IA Marks</b>	<b>: 25</b>
<b>Hrs/ Week</b>	<b>: 06 (Instruction 2 hr. + Sketching &amp; Practice 4 hr.)</b>	<b>Exam Hours</b>	<b>: 03</b>
<b>Total Hrs.</b>	<b>: 84 (Instruction 28 hr. +Sketching &amp; Practice 56 hr.)</b>	<b>Exam Marks</b>	<b>: 100</b>

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### 1. Introduction to Computer Aided Sketching

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing.

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.

**12 Hours**

### 2. Orthographic Projections

Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems).

**12 Hours**

### 3. Orthographic Projections of Plane Surfaces (First Angle Projection Only)

Introduction, Definitions—projections of plane surfaces—triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates).

**12 Hours**

### 4. Projections of Solids

#### (First angle Projection only)

Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions (No problems on octahedrons and combination solid).

**24 Hours**

### 5. Sections And Development of Lateral Surfaces of Solids

Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. (No problems on sections of solids)

Development of lateral surfaces of above solids, their frustums and truncations. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces).

**12 Hours**

#### **6. Isometric Projection (Using Isometric Scale Only)**

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three solids).

**12 Hours**

#### **Text Books:**

1. **Engineering Drawing** - N.D. Bhatt & V.M. Panchal, 48<sup>th</sup> edition, 2005-Charotar Publishing House, Gujarat.
2. **A Primer on Computer Aided Engineering Drawing-2006**, Published by VTU, Belgaum.

#### **Reference Books:**

1. **Computer Aided Engineering Drawing** - S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3<sup>rd</sup> revised edition- 2006.
2. **Engineering Graphics** - K.R. Gopalakrishna, 32<sup>nd</sup> edition, 2005-Subash Publishers Bangalore.
3. **Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production-** Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005-Prentice-Hall of India Pvt. Ltd., New Delhi.
4. **Computer Aided Engineering drawing-** Prof. M. H. Annaiah, New Age International Publisher, New Delhi. 2009.

#### **Conducting classes**

Classes may be conducted in two slots/ week of 3 hours each (Instruction 1 hr. +Sketching & Practice 2 hr.)

#### **Scheme of Evaluation for Internal Assessment (25 Marks)**

1. 15 Marks for Class work (Sketching & Computer Aided Engineering drawing printouts in A4 size sheets).
2. 10 Marks for test in the same pattern as that of the main examination.(Better of the two Tests).

All the solutions must be valued on the spot by examining the sketches, display and the hard copies. All the sketches including the computer printouts must be submitted and they must be preserved for one year.

#### **Scheme of Examination**

1. Chapter 1 is only for practice and Internal Assessment and not for examination.
2. Separate Question paper must be set for each batch of students, jointly by the Internal & External examiners.
3. A maximum of **THREE** questions must be set as per the following pattern (*No mixing of questions from different Chapters*).

<b>Q. No.</b>	<b>From Chapters</b>	<b>Marks Allotted</b>
1	Chapter 2 or Chapter 3	30
2	Chapter 4	40
3	Chapter 5 or Chapter 6	30
<b>Total</b>		<b>100</b>

#### **Scheme of Evaluation**

<b>Q. No.</b>	<b>Solutions &amp; Sketching on graph book</b>	<b>Computer display &amp; printout</b>	<b>Total Marks</b>
1	10 Marks	20 Marks	30
2	15 Marks	25 Marks	40
3	15 Marks	15 Marks	30
<b>Total</b>	<b>40 Marks</b>	<b>60 Marks</b>	<b>100</b>

Students have to submit the computer printouts and the sketches drawn on the graph sheets at the end of the examination. Both Internal & External examiners have to jointly evaluate the solutions (sketches) and computer display & printouts of each student for 100 marks (40 marks for solutions & sketches + 60 marks for computer display and printouts) and submit the marks list along with the solution (sketches) on graph sheets & computer printouts in separate covers.

4. Each batch must consist of a minimum of 10 students and a maximum of 12 students.
5. Examination can be conducted in parallel batches, if necessary.

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## BASIC ELECTRICAL ENGINEERING

<b>Sub Code</b>	<b>:</b>	<b>10ELE15/ 10ELE25</b>	<b>IA Marks</b>	<b>:</b>	<b>25</b>
<b>Hrs/ Week</b>	<b>:</b>	<b>04</b>	<b>Exam Hours</b>	<b>:</b>	<b>03</b>
<b>Total Hrs.</b>	<b>:</b>	<b>52</b>	<b>Exam Marks</b>	<b>:</b>	<b>100</b>

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### PART – A

#### UNIT-1

**1-a) D. C. Circuits:** Ohm's Law and Kirchoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources. Power and Energy. Illustrative examples.

**4Hours**

**1-b) Electromagnetism:** Faradays Laws, Lenz's Law, Fleming's Rules, Statically and dynamically induced emf's. Concept of self inductance, mutual inductance and coefficient of coupling. Energy stored in magnetic field. Illustrative examples.

**3Hours**

#### UNIT-2

**2.Single-phase A.C. Circuits:** Generation of sinusoidal voltage, definition of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities. Analysis, with phasor diagrams, of R, L, C, R-L, R-C and R-L-C circuits, real power, reactive power, apparent power and power factor. Illustrative examples involving series, parallel and series- parallel circuits.

**7 Hours**

#### UNIT-3

**3 Three Phase Circuits:** Necessity and advantages of three phase systems, generation of three phase power, definition of Phase sequence, balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced three-phase circuits, measurement of power by two-wattmeter method. Illustrative examples.

**6 Hours**

#### UNIT-4

**4-a) Measuring Instruments:** Construction and Principle of operation of dynamometer type wattmeter and single-phase induction type energy meter (problems excluded).

**3 Hours**

**4-b) Domestic Wiring:** Service mains, meter board and distribution board. Brief discussion on Cleat, Casing & Capping and conduit (concealed) wiring. Two-way and three-way control of a lamp. Elementary discussion on fuse and Miniature Circuit Breaker (MCB's). Electric shock, precautions against shock –Earthing: Pipe and Plate.

**3 Hours**

## **PART – B**

### **UNIT-5**

**5.DC Machines:** Working principle of DC machine as a generator and a motor. Types and constructional features. emf equation of generator, relation between emf induced and terminal voltage enumerating the brush drop and drop due to armature reaction. Illustrative examples.

DC motor working principle, Back emf and its significance, torque equation. Types of D.C. motors, characteristics and applications. Necessity of a starter for DC motor. Illustrative examples on back emf and torque.

**7 Hours**

### **UNIT-6**

**6. Transformers:** Principle of operation and construction of single-phase transformers (core and shell types). emf equation, losses, efficiency and voltage regulation (Open Circuit and Short circuit tests, equivalent circuit and phasor diagrams are excluded). Illustrative problems on emf equation and efficiency only.

**7 Hours**

### **UNIT-7**

**7. Synchronous Generators:** Principle of operation. Types and constructional features. emf equation. Concept of winding factor (excluding derivation of distribution and pitch factors). Illustrative examples on emf equation.

**6 Hours**

### **UNIT-8**

**8. Three Phase Induction Motors:** Concept of rotating magnetic field. Principle of operation. Types and Constructional features. Slip and its significance. Applications of squirrel - cage and slip - ring motors. Necessity of a starter, star-delta starter. Illustrative examples on slip calculations.

**6 Hours**

### **Text Books:**

1. “Basic Electrical Engineering”, D C Kulshreshtha, ,TMH,2009 Edition.
2. “Fundamentals of Electrical Engineering”, Rajendra Prasad, PHI, Second Edition, 2009.

**Reference Books:**

- 1 "Electrical Technology", E. Hughes International Students 9<sup>th</sup> Edition, Pearson, 2005.
- 2 "Basic Electrical Engineering", Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, TMH, First reprint 2009.
- 3 Problems in Electrical Engineering, Parker Smith, CBS Publishers and Distributors, 9<sup>th</sup> Edition, 2003.

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## BASIC ELECTRONICS

Sub Code : 10ELN15 / 10ELN25	IA Marks : 25
Hrs/ Week : 04	Exam Hours : 03
Total Hrs. : 52	Exam Marks : 100

### PART - A

#### UNIT-1

**SEMICONDUCTOR DIODES AND APPLICATIONS:** p-n junction diode, Characteristics and Parameters, Diode approximations, DC load line, Temperature dependence of p-n characteristics, AC equivalent circuits, Zener diodes Half-wave diode rectifier, Ripple factor, Full-wave diode rectifier, Other full-wave circuits, Shunt capacitor filter - Approximate analysis of capacitor filters, Power supply performance, Zener diode voltage regulators, Numerical examples as applicable.

**7 Hours**

#### UNIT-2

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

**6 Hours**

#### UNIT-3

**BIASING METHODS:** Base Bias, Collector to Base Bias, Voltage divider Bias, Comparison of basic bias circuits, Bias circuit design, Thermal Stability of Bias Circuits (Qualitative discussions only).

**6 Hours**

#### UNIT-4

**OTHER DEVICES:** Silicon Controlled Rectifier (S.C.R), SCR Control Circuits, More S.C.R applications; Unijunction transistor, UJT applications, Junction Field effect Transistors(Exclude Fabrication and Packaging), JFET Characteristics, FET Amplifications, Numerical examples as applicable.

**7 Hours**

### PART - B

#### UNIT-5

**AMPLIFIERS & OSCILLATORS:** Decibels and Half power points, Single Stage CE Amplifier and Capacitor coupled two stage CE amplifier(Qualitative discussions only), Series voltage negative feedback and Additional effects of Negative feed back(Qualitative discussions only), The Barkhausen Criterion for Oscillations, BJT RC phase shift oscillator, Hartley, Colpitts and crystal oscillator ( Qualitative discussions only) Numerical problems as applicable.

**6 Hours**

**UNIT-6**

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

**6 Hours**

**UNIT-7**

**COMMUNICATION SYSTEMS:** Block diagram, Modulation, Radio Systems, Superhetrodyne Receivers, Numerical examples as applicable

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

**7 Hours**

**UNIT-8**

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

**7 Hours**

**Text Books:**

1. Electronic Devices and Circuits: David. A. Bell; Oxford University Press, 5<sup>th</sup> Edn., 2008.

**Reference Books:**

1. Electronic Devices and Circuits: Jacob Millman, Christos C. Halkias TMH, 1991 Reprint 2001.
2. Electronic Communication Systems, George Kennedy, TMH 4th Edition.
3. Digital Logic and Computer Design, Morris Mano, PHI, EEE.
4. Basic Electronics, RD Sudhaker Samuel, U B Mahadevaswamy, V. Nattarsu, Saguine-Pearson, 2007.

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## WORKSHOP PRACTICE

<b>Sub Code</b>	<b>:</b>	<b>10WSL16/ 10WSL26</b>	<b>IA Marks</b>	<b>:</b>	<b>25</b>
<b>Hrs/ Week</b>	<b>:</b>	<b>03</b>	<b>Exam Hours</b>	<b>:</b>	<b>03</b>
<b>Total Hrs.</b>	<b>:</b>	<b>42</b>	<b>Exam Marks</b>	<b>:</b>	<b>50</b>

### 1. Fitting

- i. Study of fitting tools
- ii. Study of fitting operations & joints
- iii. Minimum 5 models involving rectangular, triangular, semi circular and dovetail joints.

### 2. Welding

- iv. Study of electric arc welding tools & equipments
- v. Minimum 4 Models- electric arc welding-Butt joint, Lap joint, T-joint & L-joint.

### 3. Study and demonstration of Sheet metal and soldering work.

### 4. Study & demonstration of power Tools in Mechanical Engineering

### **Scheme of Examination:**

Fitting	30 Marks
Welding	10 Marks
Viva Voce	10 marks

### **Reference Book:**

1. The Elements of Workshop Technology -, Vol 1 & 2, S.K.H. Choudhury, A.K.H.Choudhury, Nirjhar Roy, 11<sup>th</sup> edition, 2001, Media Promoters and Publishers, Mumbai.

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## COMPUTER PROGRAMMING LABORATORY

<b>Subject Code</b>	<b>: 10CPL16 / 10CPL26</b>	<b>IA Marks</b>	<b>: 25</b>
<b>Hrs/Week</b>	<b>: 03</b>	<b>Exam Hours</b>	<b>: 03</b>
<b>Total Hrs.</b>	<b>: 42</b>	<b>Exam Marks</b>	<b>: 50</b>

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### PART – A

1. Design, develop and execute a program in C to find and output all the roots of a given quadratic equation, for non-zero coefficients.
2. Design, develop and execute a program in C to implement Euclid's algorithm to find the GCD and LCM of two integers and to output the results along with the given integers.
3. Design, develop and execute a program in C to reverse a given four digit integer number and check whether it is a palindrome or not. Output the given number with suitable message.
4. Design, develop and execute a program in C to evaluate the given polynomial  $f(x) = a_4x^4 + a_3x^3 + a_2x^2 + a_1x + a_0$  for given value of x and the coefficients using Horner's method.
5. Design, develop and execute a program in C to copy its input to its output, replacing each string of one or more blanks by a single blank.
6. Design, develop and execute a program in C to input N integer numbers in ascending order into a single dimensional array and perform a binary search for a given key integer number and report success or failure in the form of a suitable message.
7. Design, develop and execute a program in C to input N integer numbers into a single dimensional array, sort them in ascending order using bubble sort technique and print both the given array and the sorted array with suitable headings.
8. Design, develop and execute a program in C to compute and print the word length on the host machine.

### PART – B

9. Design, develop and execute a program in C to calculate the approximate value of  $\exp(0.5)$  using the Taylor Series expansion for the exponential function. Use the terms in the expansion until the last term is less than the machine epsilon defined FLT\_EPSILON in the header file <float.h>. Also print the value returned by the Mathematical function  $\exp()$ .
10. Design, develop and execute a program in C to read two matrices A (M x N) and B (P x Q) and compute the product of A and B if the matrices are compatible for multiplication. The program must print the input matrices and

the resultant matrix with suitable headings and format if the matrices are compatible for multiplication, otherwise the program must print a suitable message. (For the purpose of demonstration, the array sizes M, N, P, and Q can all be less than or equal to 3)

11. Design, develop and execute a parallel program in C to add, element-wise, two one-dimensional arrays A and B of N integer elements and store the result in another one-dimensional array C of N integer elements.

12. Design and develop a function `rightrot(x, n)` in C that returns the value of the integer x rotated to the right by n bit positions as an unsigned integer. Invoke the function from the main with different values for x and n and print the results with suitable headings.

13. Design and develop a function `isprime(x)` that accepts an integer argument and returns 1 if the argument is prime and 0 otherwise. The function must use plain division checking approach to determine if a given number is prime. Invoke this function from the main with different values obtained from the user and print appropriate messages.

14. Design, develop and execute a parallel program in C to determine and print the prime numbers which are less than 100 making use of algorithm of the Sieve of Eratosthenes.

15. Design and develop a function `reverses(s)` in C to reverse the string s in place. Invoke this function from the main for different strings and print the original and reversed strings.

16. Design and develop a function `match any(s1,s2)` which returns the first location in the string s1 where any character from the string s2 occurs, or - 1 if s1 contains no character from s2. Do not use the standard library function which does a similar job! Invoke the function `match any(s1, s2)` from the main for different strings and print both the strings and the return value from the function `match any(s1,s2)`.

**Note:** In the practical examination, the student has to answer two questions. One question from Part A and one question from Part B will be selected by the student by lots. All the questions listed in the syllabus have to be included in the lots. The change of question (Part A only / Part B only / Both Part A & Part B) has to be considered, provided the request is made for the same, within half an hour from the start of the examination. The allotment of marks is as detailed below:

Sl. No.	Activity		Max. Marks
1.	Procedure Writing program & procedure for the assigned problems along with algorithms / flowchart	Part A	5*
		Part B	5*
2.	Conduction Execution of the program and	Part A	10

	showing the results in proper format	Part B	20
3.	Viva-voce**		10
Total Max. Marks			50
Minimum passing Marks (40% of Max. Marks)			20

\* To be considered as zero if student has been allowed change of question.

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## LABORATORY EXPERIMENTS IN ENGINEERING PHYSICS

<b>Sub Code</b> :	<b>10PHYL17/10PHYL27</b>	<b>IA Marks</b> :	<b>25</b>
<b>Hrs/ Week</b> :	<b>03</b>	<b>Exam Hours</b> :	<b>03</b>
<b>Total Hrs.</b> :	<b>10 (To be completed)</b>	<b>Exam Marks</b> :	<b>50</b>

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### EXPERIMENTS :

1. Series & Parallel LCR Circuits.(Determination of resonant frequency & quality factor)
2. I-V Characteristics of Zener Diode.(determination of knee voltage, zener voltage & forward resistance)
3. Characteristics of a Transistor.(Study of Input & Output characteristics and calculation of input resistance, output resistance & amplification factor)
4. Photo Diode Characteristics.(Study of I-V characteristics in reverse bias and variation of photocurrent as a function of reverse voltage & intensity)
5. Ultrasonic Interferometer (Measurement of velocity of sounds in solids/liquids).
6. Dielectric constant (Measurement of dielectric constant).
7. Magnetic properties (Study of retentivity and coercivity by B-H graph method).
8. Diffraction (Measurement of wavelength of laser / Hg source using diffraction grating).
9. Planck's constant (Using the principle of photoelectric effect/LED's).
10. Electrical Resistivity ( Determination of resistivity in semiconductor by Four probe method).
11. Verification of Stefan's law.
12. Determination of Fermi energy.(Measurement of Fermi energy in copper)
13. Uniform Bending Experiment.(Determination of Youngs modulus of material bar)
14. Newtons Rings.(Determination of radius of curvature of planoconvex lens)

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## ENGINEERING CHEMISTRY LABORATORY

<b>Sub Code</b> :	<b>10CHEL17/10CHEL27</b>	<b>IA Marks</b> :	<b>25</b>
<b>Hrs/ Week</b> :	<b>03</b>	<b>Exam Hours</b> :	<b>03</b>
<b>Total Hrs.</b> :	<b>42</b>	<b>Exam Marks</b> :	<b>50</b>

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### PART – A

1. Potentiometric estimation of FAS using standard  $K_2Cr_2O_7$  solution
2. Colorimetric estimation of Copper
3. Conductometric estimation of an Acid mixture using standard NaOH solution
4. Flame Photometric estimation of Sodium and Potassium in the given sample of Water
5. Determination of pKa of a weak acid using pH Meter
6. Determination of Viscosity co-efficient of a given liquid using Ostwald's Viscometer.

### PART – B

1. Determination of Total Hardness of a sample of Water using Disodium salt of EDTA.
2. Determination of CaO in the given sample of Cement by Rapid EDTA method.
3. Determination of Percentage of Copper in Brass using standard Sodium thiosulphate solution.
4. Determination of Iron in the given sample of Haematite ore solution using Potassium dichromate Crystals by external indicator method.
5. Determination of COD of the given Industrial Waste water sample.
6. Determination of Total Alkalinity of a given Water Sample using standard Hydrochloric acid.

### References Books:

- 1) Laboratory manual in Engineering Chemistry Sudharani, Dhanpatrai Publishing Company.
- 2) Vogel's Text Book of Quantitative Chemical Analysis revised by G.H.Jeffery, J. Bassett, J. Mendham and R.C Denney.

### Scheme of Examination:

One experiment from Part- A and another from Part - B shall be set. Different experiments may be set from Part- A and a common experiment from Part – B.

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## CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS

<b>Sub Code</b>	<b>: 10CIP18/10CIP28</b>	<b>IA Marks</b>	<b>:</b>	<b>25</b>
<b>Hrs/ Week</b>	<b>: 02</b>	<b>Exam Hours</b>	<b>:</b>	<b>02</b>
<b>Total Hrs.</b>	<b>: 26</b>	<b>Exam Marks</b>	<b>:</b>	<b>50</b>

- 1 Preamble to the constitution of India. Fundamental rights under Part – III – details of Exercise of rights, Limitations & Important cases. **4 Hours**
- 2 Relevance of Directive principles of State Policy under Part – IV. Fundamental duties & their significance. **3 Hours**
- 3 Union Executive – President, Prime Minister, Parliament & the Supreme Court of India. **3 Hours**
- 4 State executive – Governors, Chief Minister, State Legislator and High Courts. **3 Hours**
- 5 Constitutional Provisions for Scheduled Castes & Tribes, Women & Children & Backward classes. Emergency Provisions. **4 Hours**
- 6 Electoral process, Amendment procedure, 42nd, 44th, 74th, 76th, 86th and 91st Constitutional amendments. **3 Hours**
- 7 Scope & aims of engineering Ethics. Responsibility of Engineers. Impediments to responsibility. **3 Hours**
- 8 Honesty, Integrity and reliability, risks, safety & liability in engineering. **3 Hours**

### **Text Books:**

1. Durga Das Basu: “Introduction to the Constitution of India” (Students Edn.) Prentice – Hall EEE, 19<sup>th</sup>/20<sup>th</sup> Edn., 2001.
2. “Engineering Ethics” by Charles E.Haries, Michael. S.Pritchard and Michael J.Robins Thompson Asia, 2003-08-05.

### **Reference Books:**

1. “An Introduction to Constitution of India” by M.V.Pylee, Vikas Publishing, 2002.
2. “Engineering Ethics” by M. Govindarajan, S.Natarajan, V.S. Senthilkumar., Prentice – Hall of India Pvt. Ltd. New Delhi, 2004.

### **Scheme of examination:**

Question paper is of objective type. Students have to pass this subject compulsorily. However, marks will not be considered for awarding class/rank.

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## ENVIRONMENTAL STUDIES

<b>Sub Code</b>	<b>: 10CIV18/10CIV28</b>	<b>IA Marks</b>	<b>: 25</b>
<b>Hrs/ Week</b>	<b>: 02</b>	<b>Exam Hours</b>	<b>: 02</b>
<b>Total Hrs.</b>	<b>: 26</b>	<b>Exam Marks</b>	<b>: 50</b>

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### PART – A

#### UNIT-1

Environment -\_ Definition, Eco system -- Balanced ecosystem, Human activities - Food, Shelter, Economic and Social Security

**3 Hours**

#### UNIT-2

Effects of human activities on environment - Agriculture, Housing, Industry, Mining, and Transportation activities, Environmental Impact Assessment. Sustainable Development.

**3 Hours**

#### UNIT-3

Natural Resources - Water resources - Availability and Quality aspects. Water borne diseases, Water induced diseases, Fluoride problem in drinking water. Mineral Resources, Forest Wealth, Material Cycles - Carbon, Nitrogen and Sulphur Cycles.

**4 Hours**

#### UNIT-4

Energy - Different types of energy, Electro-magnetic radiation. Conventional and Non - Conventional sources - Hydro Electric, Fossil fuel based, Nuclear, Solar, Biomass and Bio-gas. Hydrogen as an alternative future source of Energy.

**4 Hours**

### PART – B

#### UNIT-5

Environmental Pollution and their effects. Water pollution. Land pollution . Noise pollution . Public Health aspects.

**3 Hours**

#### UNIT-6

Current Environmental issues of importance:  
Population Growth, Climate change and Global warming - Effects,  
Urbanization, Automobile pollution

**3 Hours**

## **UNIT-7**

Acid Rain, Ozone layer depletion, Animal Husbandry

**3 Hours**

## **UNIT-8**

Environmental Protection - Role of Government, Legal aspects, Initiatives by Non - Governmental Organizations (NGO), Environmental Education, Women Education.

**3 Hours**

Question paper is of objective type for 50 marks (**Fifty questions have to be set with 4 multiple choice answers**). Students have to pass the subject compulsorily. However, marks will not be considered for awarding class/rank.

### **Text Books:**

- 1) Benny Joseph (2005), "Environmental Studies", Tata McGraw -Hill Publishing Company Limited
- 2) Ranjit Daniels R.J. and Jagdish Kirshnaswamy, (2009), "Environmental Studies", Wiley India Private Ltd., NewDelhi
- 3) Rajagopalan R. (2005), "Environmental Studies – From Crisis to Cure", Oxford Univesity Press

### **Reference Books:**

- 1) Raman Sivakumar, (2005), "Principles of Environmental Science and Engineering", Second Edition, Cengage learning, Singapore
- 2) Meenakshi P. (2006), "Elements of Environmental Science and Engineering", Prentice Hall of India Private Limited, NewDelhi
- 3) Prakash S.M. (2007), "Environmental Studies", Elite Publishers, Mangalore
- 4) Erach Bharucha (2005), "Text Book of Environmental Studies", for UGC, University Press
- 5) Tyler Miller Jr. G. (2004), "Environmental Science – Working with the Earth", Tenth Edition, ThomsonBrooks/Cole
- 6) Tyler Miller Jr. G. (2006), "Environmental Science – Working with the Earth", Eleventh Edition, ThomsonBrooks/Cole
- 7) "Text Book of Environmental and Ecology" by Dr. Pratibha Sing, Dr. Anoop Singh and Dr. Piyush Malaviya. Acme Learning Pvt. Ltd., New Delhi.

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## ENGINEERING MATHEMATICS – II

<b>Sub Code</b>	<b>:</b>	<b>10MAT21</b>	<b>IA Marks</b>	<b>:</b>	<b>25</b>
<b>Hrs/ Week</b>	<b>:</b>	<b>04</b>	<b>Exam Hours</b>	<b>:</b>	<b>03</b>
<b>Total Hrs.</b>	<b>:</b>	<b>52</b>	<b>Exam Marks</b>	<b>:</b>	<b>100</b>

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### PART-A

#### UNIT-1

##### Differential Equations - 1

Equations of first order and higher degree (p-y-x equations), Equations solvable for p-y-x. General and singular solutions, Clairaut's equation. Applications of differential equations of first order–illustrative examples\*.

**6 Hours**

#### UNIT-2

##### Differential Equations – 2

Linear differential equations: Solution of second and higher order equations with constant coefficients by inverse differential operator method. Simultaneous differential equations of first order –Applications.

**7 Hours**

#### UNIT-3

##### Differential Equations – 3

Method of variation of parameters, Solutions of Cauchy's and Legendre's linear equations, Series solution of equations of second order, Frobenius method – simple problems.

**6 Hours**

#### UNIT-4

##### Partial Differential Equations (PDE)

Formation of Partial differential equations (PDE) by elimination of arbitrary constants/ functions. Solution of non-homogeneous PDE by direct integration. Solution homogeneous PDE involving derivative with respect to one independent variable only. Solution of Lagrange's linear PDE. Solution of PDE by the Method of separation of variables (first and second order equations)

**7 Hours**

### PART-B

#### UNIT-5

##### Integral Calculus

Multiple Integrals – Evaluation of Double integrals and triple integrals. Evaluation of double integrals over a given region, by change of order of integration, by change of variables. Applications to area and volume – illustrative examples\*.

Beta and Gamma Functions - Properties and problems

**6 Hours**

**UNIT-6****Vector Integration**

Line integrals – definition and problems, Surface and volume integrals- definition. Green's theorem in a plane, Stoke's and Gauss divergence theorem (statements only).

**6 Hours**

**UNIT-7****Laplace Transforms-1**

Definition, transforms of elementary functions, properties, Periodic function, Unit step function and unit impulse function.

**7 Hours**

**UNIT-8****Laplace Transforms-2**

Inverse Laplace Transforms, Convolution theorem, solution of linear differential equations using Laplace transforms. Applications – illustrative examples\*.

**7 Hours**

**Note: \* In the case of illustrative examples, questions are not to be set.**

**Text Books:**

- 1) B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers.
- 2) Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

**Reference Book:**

- 1) B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
- 2) Peter V. O'Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd. Publishers.

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## FUNCTIONAL ENGLISH

Introduction	Importance of Languages	
Grammar	Parts of Speech, Usage of Preposition and Article, Punctuation	5 Hours
Tenses & Degrees of Comparison		3 Hours
Transformation of Sentences	Active-Passive, Affirmative-Negative, Exclamatory-Assertive, Interrogative-Assertive, Kinds of sentences	5 Hours
Direct-Indirect Speech		5 Hours
Vocabulary Usage	Homonyms, Correcting Spelling, One-word equivalents	7 Hours
Precis Writing		3 Hours
Essay/Report Writing		5 Hours
Letter Writing	Personal, Official, Applications	5 Hours
Idioms & Phrases	Meaning & Usage in sentences	5 Hours
Comprehension	Of an unseen passage	2 Hours
Elaboration	Expansion of ideas, proverbs	2 Hours
Presentation	Preparation of materials and presentation – step	3 Hours

### **Suggested Text Books:**

- 1) Basic Grammar, SLN Sharma & K Shankaranarayana, Navakarnataka Publications.
- 2) New International Business English by Jones, published by Cambridge University Press.

### **Reference Books:**

- 1) English Rank Scorer, G. Sankaran, Addone Publishing group, Thiruvananthapuram, Kerala
- 2) English Grammar, Wren & Martin
- 3) Oxford Guide to Speaking and Writing by John Seely, 2000

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## KANNADA KALI

### SYLLABUS

- Lesson 1 : Introducing each other – 1.  
Personal Pronouns, Possessive forms, Interrogative words.
- Lesson 2 : Introducing each other – 2.  
Personal Pronouns, Possessive forms, Yes/No Type  
Interrogation
- Lesson 3 : About Ramanaya.  
Possessive forms of nons, dubitive question, Relative nouns
- Lesson 4 : Enquiring about a room for rent.  
Qualitative and quantitative adjectives.
- Lesson 5 : Enquiring about the college.  
Predicative forms, locative case.
- Lesson 6 : In a hotel  
Dative case defective verbs.
- Lesson 7 : Vegetable market.  
Numeral, plurals.
- Lesson 8 : Planning for a picnic.  
Imperative, Permissive, hortative.
- Lesson 9 : Conversation between Doctor and the patient.  
Verb- iru, negation – illa, non – past tense.
- Lesson 10: Doctors advise to Patient.  
Potential forms, no – past continuous.
- Lesson 11: Discussing about a film.  
Past tense, negation.
- Lesson 12: About Brindavan Garden.  
Past tense negation.

- Lesson 13: About routine activities of a student.  
Verbal Participle, reflexive form, negation.
- Lesson 14: Telephone conversation.  
Past and present perfect past continuous and their negation.
- Lesson 15: About Halebid, Belur.  
Relative participle, negation.
- Lesson 16: Discussing about examination and future plan.  
Simple conditional and negative
- Lesson 17: Karnataka (Lesson for reading)
- Lesson 18: Kannada Bhaashe (Lesson for reading)
- Lesson 19: Mana taruva Sangati alla (Lesson for reading)
- Lesson 20: bEku bEDagaLu (lesson for reading)

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**PÀ£ÀBqÀ ªÄ£À,ÄÄ**

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- 3) zÉÆÄtÄ ºÀjUÉÆÄ®ÄUÄ¼Äºè ( ¥ÀæªÁ,À PÀxÀ£À) 2ªÄgÁªÄÄ PÁgÀAvÀ
- 4) CtÛ¥Àà£À gÉÄµÉä PÁ-Ä-É ( ¥Àæ§AzsÀ) PÄÄªÉÄ¥ÄÄ
- 5) £ÀªÄÄª JªÉÄäUÉ ªÄÄvÄÄÛ w½0iÄÄÄªÄzÉÄ ( «£ÉÆÄzÀ) UÉÆÄgÀÆgÄÄ gÁªÄÄ,Áé«Ä C0iÄÄªAUÁgi
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- 8) gÉÆEnª ªÄÄvÄÄÛ PÉÆÄ« (PÀªÀ£À) ,ÄÄ.gÄÄ.JPÄÄÄÄr
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- 10) aÄAPÀæªÉÄÄ¹Û ªÄÄvÄÄÛ ºªÄÄªÄÄ«ÄÄ£ÄÄ ( ¥Äj,ÀgÀ - ÉÄR£À) PÉ.¥ÀÇtðZÀAzÀæ vÉÄd'é
- 11) UÁAçü (PÀvÉ) ´É,ÀUÀgÀºÀ½i gÁªÄÄtÜ
- 12)´ÉºÑ0iÄÄ ºÁqÄÄ (PÀªÀ£À) ¹zÀPºAUÀ0iÄÄª
- 13) J®è ºÄÄqÄÄV0iÄÄgÄ PÀ£À,ÄÄ (PÀªÀ£À) ,Ä«vÁ £ÁUÄªsÀÆµ Àt
- 14) ¢ÄgÄÄ (PÀvÉ) §,ÀªÄgÄd PÄÄPÄìgÀºÀ½i
- 15) PÀ£ÁðIPÀ ,ÄA,Äìçw0iÄÄ ,ÀégÀÆ¥À ( ¥ÄjZÀ0iÄÄ - ÉÄR£À) gÀºÀªÄÄvÀ vÄjÄPÉgÉ

- 16)  $v \Delta A v \Delta \alpha e \tilde{A} \tilde{O} \xi \Delta P \Delta^\circ P \tilde{E} 0 i \tilde{A} \tilde{A}^\circ \tilde{e} \tilde{ } s \tilde{A} \mu \tilde{E} (v \Delta A v \Delta \alpha e \tilde{A} \tilde{O} \xi \Delta \xi g \tilde{A}^\circ \tilde{A}) J, \tilde{i}, \tilde{A} \tilde{A} z \tilde{A} \tilde{g} \tilde{i}$
- 17)  $P \tilde{E} \tilde{A} t^\alpha \tilde{E} \tilde{A} \tilde{U} \tilde{E} q \tilde{A} (P \tilde{A}^\alpha \tilde{A} \tilde{a}) e \tilde{A} \xi \tilde{A} \tilde{Y} \tilde{A} z \tilde{A}$

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