**ENGINEERING MATHEMATICS-I**

**(Common to all branches)**

**[As per Choice Based Credit System (CBCS) scheme]**

**(Effective from the academic year 2018-19)**

| | |
|---|---|
| **Course Code : 18MAT11** | **CIE Marks : 50** |
| **Contact Hours/Week : 04** | **SEE Marks: 50** |
| **Total Hours:50** | **Exam Hours:03** |
| **Semester : I** | **Credits: 04** |

**Course Learning Objectives:**

This course Calculus and Linear Algebra (18MAT11) will enable students:

• To familiarize the important tools of calculus and differential equations that are essential in all branches of engineering.

• To develop the knowledge of matrices and linear algebra in a comprehensive manner.

**MODULE-I**

**Differential Calculus-1:**

Successive Differentiation: Standard Forms of nth derivative(without proof), examples on standard functions, Leibnitz Theorem (without proof) examples, Taylor's and Maclaurin's series expansions for one variable (statements only), Indeterminate forms.

**10 - Hours**

**MODULE-II**

**Differential Calculus-2**:

Polar Curves: Angle between radius vector and tangent, length of perpendicular from pole to the tangent, angle between two polar curves, Pedal Equation of polar curves and problems.

Derivative of arc length: Cartesian, parametric and polar form(without proof).

Radius of Curvature: Cartesian, polar form(without proof) and problems, parametric and pedal equation (Without proof) and problems.

**10 - Hours**

**MODULE-III**

**Differential Calculus-3**:

Defination of Partial Differentiation, Direct & Indirect derivatives, Symmetric functions, Homogeneous function and Eulers Theorem on homogeneous function.

Differential Equation : Exact and Reducible to exact differential equation, Bernoullie's linear differential equation.Newton's law of cooling, Law of decay and growth. Orthogonal trajectories.

**10 - Hours**

**MODULE-IV**

**Integral Calculus**:

Reduction Formulae of and problems.

Double and Triple integral examples, Evaluation of double integral over a specific region, changing the order of integration , changing into polar form. Application of integral area and volume.

**10 - Hours**

**MODULE-V**

**Matrices:**

Rank of matrix, Rank nullity theorem, Test of consistency by rank, solution of linear equations by Gauss Elimination, Eigen values and Eigen vector, Diagonalization of matrix by congruent

method, Cayley- Hamilton method, Rayleigh's Power method to find largest Eigen value and corresponding Eigen vector. **10 - Hours**

## Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

**Reference books:**

1. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition,
2. McGraw-Hill Book Co., New York, 1995.
2. James Stewart : "Calculus –Early Transcendentals", Cengage Learning India Private Ltd., 2017.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Srimanta Pal & Subobh C Bhunia: "Engineering Mathematics", Oxford University Press,3rd Reprint, 2016.
5. Gupta C.B., Singh S.R. and Mukesh Kumar: "Engineering Mathematics for Semester I & II", Mc-Graw Hill Education (India) Pvt.Ltd., 2015.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org.

**Course Outcomes:**

On completion of this course, students are able to:

| CO # | Course Outcomes |
|---|---|
| CO 1 | Understand the concepts on limits of a function by expressing in terms of power series . |
| CO 2 | Learn the concepts based on calculus to solve problems on polar curves and its applications in determining the bendness of a curve. |

| | |
|---|---|
| **CO 3** | Apply the notion of partial differentiation to calculate rates of change of multivariate functions |
| **CO 4** | Analyse the integral terms by changing the order of integration and to evaluate multiple integrals and their applications in terms of area and volumes. |
| **CO 5** | Make use of matrix theory for solving system of linear equations and compute Eigen values and Eigen vectors. |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | | | | | | | | | | |
| CO2 | 3 | 1 | | | | | | | | | | |
| CO3 | 3 | 2 | | | | | | | | | | 1 |
| CO4 | 3 | 2 | | | | | | | | | | 1 |
| CO5 | 3 | 2 | | | | | | | | | | 1 |

**Question Paper Pattern:**

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

• The question paper will have ten full questions carrying equal marks.
• Each full question carries 20 marks.
• There will be two full questions (with a maximum of four sub questions) from each module
• Each full question will have sub questions covering all the topics under a module.
• The students will have to answer five full questions, selecting one full question from each module.

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# ENGINEERING PHYSICS

**(Common to all Branches)**
**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the academic year 2018-19)**

**Course Code : 18PHY12/22** **CIE Marks : 50**
**Contact Hours/Week : 04** **SEE Marks: 50**
**Total Hours: 50** **Exams. Hours: 03**
**Semester: I/II** **Credits: 04**

**Course Learning Objectives:** This course (18PHY12/22) will enable students to

- Gain knowledge of different types of oscillations and shock waves, their generation and practical applications.
- Develop comprehensive understanding of elastic properties of materials, their limitations and causes of elastic failure.
- Gain a fundamental knowledge of Optical fibers, vector calculus and their applications in Electromagnetic waves.
- Develop fundamental understanding of the principles of lasers, quantum mechanics and their applications
- Acquire an understanding of free electron theory of metals, especially semiconductor & quantum structure

## MODULE - 1

**Oscillations and Waves**

**Free Oscillations:** Definition of SHM, derivation of equation for SHM, Mechanical and electrical simple harmonic oscillators (mass suspended to spring oscillator). Equation of motion for free oscillations, Natural frequency of oscillations.

**Damped and forced oscillations :** Theory of damped oscillations : over damping, critical & under damping, quality factor. Theory of forced oscillations and resonance, sharpness of resonance. One example for mechanical resonance.

**Shock Waves:** Mach number, Shock Waves. Laws of conservation of mass, energy and momentum. Construction and working of Reddy shock tube, applications of shock waves.
**Numerical Problems**. **10 - Hours**

**MODULE - 2**

**Elastic Properties of Materials :**
**Elasticity :** Concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, Hooke's Law, different elastic moduli, Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus (K) &Rigidity modulus (n) in terms of α & β. Relation between Y, n & K, limits of Poisson's ratio.

**Bending of beams:** Derivation of expression for bending moment. Single Cantilever, derivation of expression for Young's modulus.

**Torsion of Cylinder :** Expression for couple for unit twist of a solid cylinder (Derivation ), Torsional pendulum – Expression for period of oscillation.
**Numerical Problems.** **10 - Hours**

**MODULE - 3**

**Optical Fibers and Maxwell's Equation**
**Optical Fibers :** Propagation Mechanism, angle of acceptance. Numerical aperture. Modes of Propagation & types of optical fibers, attenuation, Expression for attenuation coefficient, discussion of block diagram of point to point of communication system. Applications of optical fibers.
**Maxwell's equation :** Fundamentals of vector calculus, divergence & curl of electric field & magnetic field ( static ), Gauss divergence theorem & Stoke's theorem. Description of laws of electrostatics, Magnetism & Faraday's laws of EMI.
**Numerical Problems.** **10 - Hours**

**MODULE - 4**

**Quantum Mechanics and Lasers**
**Quantum Mechanics :** Heisenberg uncertainty principle, applications (non-existence of electron in the nucleus), wave function, properties of wave function, time independent Schrodinger wave equation, applications ( particle in box ).
**Lasers :** Principles of lasers, Einstein's coefficients (derivation of expression for energy density). Requisites of laser system. Conditions for laser action. Construction & working of $CO_2$ & Semiconductor laser. applications of laser in defence ( Laser range finder) & Engineering ( data storage).
**Numerical Problems.** **10 - Hours**

**MODULE – 5**

**Material Science**
**Quantum free electron theory of metals :** Free electron concept (mean free path, mean collision time, drift velocity, relaxation time), assumptions of classical free electron theory, expression for electrical conductivity for classical free electron theory, failures of classical free

electron theory, assumptions of quantum free electron theory, expression for quantum free electron theory, success of quantum free electron theory, Fermi energy, Fermi factor, dependence of Fermi factor on temperature.

**Semiconductor Physics :** Expression for concentration for electrons in conduction band, Hole concentration in valence band ( only mention the expression), Expression for electrical conductivity in intrinsic semiconductor, law of mass action in semiconductor.

**Dielectric Materials:** Dielectrics, Mention of solid, liquid & gaseous dielectrics with one example each. Application of dielectrics in transformers.

**Numerical Problems.** **10 - Hours**

**Course Outcomes:**

Upon completion of this course, students will be able to

| | |
|---|---|
| CO1 | Analyze the principles of oscillations and shock waves, their generation processes and their diverse applications. |
| CO2 | Examine the concepts of elasticity & properties of elastic materials |
| CO3 | Describe the fundamentals of vector calculus, EM Waves, Optical fibers and their relevant applications. |
| CO4 | Describe the core principles of quantum mechanics, lasers and their applications. |
| CO5 | Provide concise overview of free electron theory & explain the different dimensions of quantum structures |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | **3** | **2** | | | | | | | | | | **1** |
| CO2 | **3** | **2** | | | | | | | | | | **1** |
| CO3 | **3** | **2** | | | | | | | | | | **1** |
| CO4 | **3** | **2** | | | | | | | | | | **1** |
| CO5 | **3** | **2** | | | | | | | | | | **1** |

**Question paper pattern:**

- The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question consisting of 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

**Text Books:**

1. A Text book of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand & Company Ltd, New Delhi

2. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017

3. Concepts of Modern Physics-Arthur Beiser: 6 th Ed;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006

**Reference books**:

1. Introduction to Mechanics — MK Verma: 2nd Ed, University Press(India) Pvt Ltd, Hyderabad 2009
2. Lasers and Non Linear Optics – BB laud, 3rd Ed, New Age International Publishers 2011
3. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018
4. Shock waves made simple- Chintoo S Kumar, K Takayama and KPJ Reddy: Willey India Pvt. Ltd. New Delhi2014
5. Introduction to Electrodynamics- David Griffiths: 4th Ed, Cambridge University Press 2017

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# ENGINEERING CHEMISTRY

**(Common to all branches)**
**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

**Course Code : 18CHE12/22** | **CIE Marks : 50**
**Contact Hours/Week : 04** | **SEE Marks: 50**
**Total Hours: 50** | **Exams. Hours: 03**
**Semester: I/II** | **Credits: 04**

**Course Learning Objectives**:

This course (**18CHE12/22**) will enable students to

- Master the basic knowledge of engineering chemistry for building technical competence in industries, research and development.

- To develop knowledge in the fields of use of free energy in chemical equilibrium, electrochemistry and energy storage systems, Corrosion and metal finishing.
- To understand the importance of energy systems, environmental pollution, waste management, water chemistry, Instrumental methods of analysis and Nanomaterials.

**MODULES**

**MODULE- I: Electrochemistry and Energy storage systems**

**Use of free Energy in Chemical Equilibria:** Thermodynamic functions: Definitions of free energy and entropy. Cell potential, derivation of Nernst equation for single electrode potential.

**Electrochemical Systems:** Reference electrodes: Introduction, construction, working and applications of Calomel electrode. Ion-selective electrode – Definition, construction and principle of Glass electrode, and determination of pH using glass electrode. Electrolyte concentration cells, numerical problems. **Energy storage systems**: Introduction, classification - primary, secondary and reserve batteries.

Construction, working and applications of Ni-MH and Li-ion batteries.

**10 - Hours**

**MODULE-II: Corrosion and Metal finishing**

**Corrosion:** Introduction, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity and temperature. Types of corrosion - Differential metal and Differential aeration - pitting and water line). Corrosion control: Metal coatings - Galvanization and Tinning. Cathodic protection - sacrificial anode and impressed current methods.

**Metal finishing:** Introduction, Technological importance. Electroplating: Introduction, principles governing electroplating-Polarization, decomposition potential and overvoltage. Electroplating of chromium (hard and decorative). Electroless plating: Introduction, nickel (Watt's method) & electroless plating of copper, distinction between electroplating and electroless plating processes.

**10 - Hours**

**MODULE-III : Energy Systems**

**Chemical Fuels**: Introduction, classification, definitions of CV, LCV, and HCV, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Knocking of petrol engine – Definition, mechanism, ill effects and prevention. Power alcohol, unleaded petrol and biodiesel.

**Fuel Cells:** Introduction, differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with $H_2SO_4$ electrolyte, and solid oxide fuel cell (SOFCs).

**Solar Energy**: Photovoltaic cells- introduction, construction and working of a typical PV cell. Preparation of solar grade silicon by Union Carbide Process/Method. Advantages & disadvantages of PV cells.

**10 - Hours**

**MODULE IV: Environmental Pollution and Water Chemistry**

**Water Chemistry:** Introduction**,** sources and impurities of water; boiler feed water, boiler troubles with disadvantages -scale and sludge formation, boiler corrosion (due to dissolved $O_2$, $CO_2$ and $MgCl_2$). Sources of water pollution, Sewage, Definitions of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), determination of COD, numerical problems on COD. Chemical analysis of water: Sulphates (gravimetry) and Fluorides (colorimetry). Sewage treatment: Primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis.

**10 - Hours**

**MODULE-V: Instrumental methods of analysis and Nanomaterials**

**Instrumental methods of analysis:** Theory, Instrumentation and applications of Colorimetry, Flame Photometry, Atomic Absorption Spectroscopy, Potentiometry, Conductometry (Strong acid with a strong base, weak acid with a strong base, mixture of strong acid and a weak acid with a strong base).

**Nanomaterials:** Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition, Nanoscale materials: Fullerenes, Carbon nanotubes and Dendrimers – properties and applications.

**10 - Hours**

**Course Outcomes:**

On completion of this course, students will have knowledge in:

| | |
|---|---|
| CO1 | To have knowledge of interconversion of energy, electrochemistry in energy storage systems. |
| CO2 | To have Knowledge causes & effects of corrosion of metals and control of corrosion, modification of surface properties of metals by metal finishing techniqu.. |
| CO3 | To have knowledge production and consumption of energy by chemical fuels and synthesis, properties & applications of polymers. |
| CO4 | To have knowledge of water quality parameters and water chemistry and green chemistry. |
| CO5 | To have knowledge of different techniques of instrumental methods of analysis, fundamentals and synthesis of nanomaterials. |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 | PSO.1 | PSO.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | | | | 1 | | | | | | | |
| CO2 | 2 | 1 | 1 | | | | 1 | | | | | | | |
| CO3 | 2 | 1 | 1 | | | | 1 | | | | | | | |
| CO4 | 2 | 1 | 1 | | | | 1 | | | | | | | |
| CO5 | 2 | 1 | 1 | | | | 1 | | | | | | | |

**Question paper pattern:**

**Note:- The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50.**

- The question paper will have **ten** full questions carrying equal marks.
- Each full question carries **20** marks.

- There will be **two** full questions (with a **maximum** of **three** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

**Text Books:**

1. P.C. Jain & Monica Jain. **"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi (2015 Edition).
2. S. S. Dara, A textbook of Engineering Chemistry, 10th Edition, S Chand & Co., Ltd., New Delhi, 2014.
3. Physical Chemistry, by P. W. Atkins, Oxford Publications (Eighth edition-2006).

**Reference books**:

1. O.G. Palanna, **"Engineering Chemistry"**, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint (2015- Edition).
2. R.V. Gadag & A. Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi (2015- Edition).
3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition-2013.
4. B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa Iyengar, Chemistry for Engineering Students, Subhash Publications, Bengaluru, (2015- Edition).

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## ELEMENTS OF CIVIL ENGINEERING

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

**Course Code : 18CIV13/23** **CIE Marks : 50**
**Contact Hours/Week : 03** **SEE Marks: 50**
**Total Hours: 38** **Exams. Hours: 03**
**Semester: I/II** **Credits: 03**

**Course Learning Objectives**:

**The objectives of this course are:**

- **To make students to learn scope of various fields of civil Engineering. Basics of Civil engineering concepts and importance of infrastructure development.**
- **To study the uses, sources, classifications and manufacture of various Building materials .**
- **To develop students ability to analyze the problem involving Forces, Moments with their applications.**

## MODULE-1
## INTRODUCTION TO CIVIL ENGINEERING.

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

Infrastructure-Types of Infrastructure, Role of civil engineering in infrastructural development, Effect of Infrastructural facilities on socio economic development of country.

History of Civil Engineering. Some of important monuments and marvels and method of construction. **08Hours**

## MODULE-2
## ROADS, BRIDGES & DAMS

**Roads** – Types, Classification of roads and their functions, components and comparison between flexible and rigid pavements (Advantages and Limitations ).

**Bridges** – Types of Bridges and Culverts.

**Dams** – Classification of dams based on material, Structural behaviour and functionality with simple sketches. **06Hours**

## MODULE-3
## BUILDING MATERIALS

**Stones** –Classification, sources, uses of stones.

**Building Blocks-** Composition of good brick, manufacturing of Bricks, solid earth brick classification, quality of good brick, uses.

**Cement**-Types of cement, Flow chart for manufacture of cement by wet process and dry process, chemical composition of cement.

**Aggregate**-Fine aggregate (Natural sand, M sand and Slag sand),Coarse aggregate (Natural and Artificial)

**Building Blocks**-Manufacturing of bricks, solid blocks, aerated blocks.

**Lime**-Classification binding materials, sources, components, uses of lime. **08Hours**

## MODULE-4
## FORCE AND FORCE SYSTEM

**INTRODUCTION TO ENGINEERING MECHANICS ,BASIC CONCEPTS OF MECHANICS AND BASIC IDEALIZATIONS OF MECHANICS.**

Force, Classification of force and Elements of force.

Parallelogram law of forces, principle of transmissibility. Principle of physical independency of force and principal of superposition of force.

Moment of forces, Couple, Moment of couple, characteristics of couple, equivalent system, Resolution of force into force and a couple, Resolution of force, Numerical Problems on moment of force and couple.

### ANALYSIS OF CONCURRENT FORCE SYSTEM

Definition of resultant, composition of coplanar concurrent force system, Principle of resolved parts

Equilibrium of force and condition of equilibrium, Equilibrant, Lami's theorem, Concept of free body diagram

Numerical problems on concurrent force system and String and body problems. **08Hours**

## MODULE-5
## SUPPORT AND SUPPORT REACTION

Definition of support reaction ,types of beams, types of loads, types of supports and Numerical Problems on various types of loads UDL,UVL and Couple.

**ANALYSIS OF NON CONCURRENT FORCE SYSTEM**

Non-concurrent force system, Geometrical representation of Moment, Varignon's Principle and Numerical problems on coplanar non concurrent force system. **08Hours**

## Course outcomes:

After a successful completion of the course, the student will be able to:

| CO # | Course Outcomes |
|---|---|
| CO 1 | Mention the applications of various fields of Civil Engineering. |
| CO 2 | To study the Classification, Functions and components of Roads, Bridges and Dams |
| CO 3 | To study the Classification, uses, sources and manufacture of building materials |
| CO 4 | Compute the action of Forces,Moments,Couples and resultant of given force system subjected to various loads. |
| CO 5 | To study about Various types of beams, loads and supports and calculate the support reaction for different support conditions and loadings. Compute Resultant of Non concurrent forces. |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 | PSO.1 | PSO.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | | | | | 2 | 1 | | | | | | 2 | |
| CO2 | 1 | | | | | 1 | 1 | | | | 1 | 1 | | 2 |
| CO3 | 1 | | | | | | 1 | | | | 1 | 1 | 1 | |
| CO4 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | | | | 1 | 1 | 2 | |
| CO5 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | | | | 1 | 2 | 2 | |

**Question Paper Pattern:**

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.

• The students will have to answer five full questions, selecting one full question from each module.

## Text Books:

1. A Textbook on Elements of Civil Engineering and Mechanics" by B.K Kolhapure
2. Elements of Civil Engineering and Mechanics" by H J SAWANT and S P Nitsure

3. A Textbook on Elements of Civil Engineering and Mechanics" by S S Bhavikatti.

## Reference books:


1. Engineering Mechanics by S.Timoshenko,D.H.Young, and J.V.Rao, TATA McGraw-Hill Book Company, New Delhi .
2. Beer FP and Johnson ER, "Mechanics for Engineers- Dynamics and Statics"- 3rd SI Metric edition, Tata McGraw Hill. - 2008
3. Elements of Civil Engineering and Engineering MechanicsbyM.N. Shesha Prakash and Ganesh. B. Mogaveer, PHI Learning, 3rRevised edition (2014)
4. Engineering Mechanics-Statics and Dynamics by A Nelson, Tata McGraw Hill Education Private Ltd, New Delhi, 2009.


# BASIC ELECTRONICS ENGINEERING

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

**Course Code : 18ELN13/23** **CIE Marks : 50**
**Contact Hours/Week : 03** **SEE Marks: 50**
**Total Hours: 40** **Exams. Hours: 03**
**Semester: I/II** **Credits: 03**

### Course Objectives:

- Understand characteristics operation and application of PN- Junction diode & Bipolar junction transistor.
- To understand different number systems & working of fundamental building blocks of digital circuits.
- To understand construction & operation of various special devices.
- To understand the principle of basic communication system

### MODULE-I

**Semiconductor Diodes and Applications**

p-n junction diode, Characteristics and Parameters, Diode approximations, Working principle with input & output waveforms along with their applications of Half-wave rectifier, Two-diode Full-wave rectifier & Bridge rectifier.

**10 - Hours**

### MODULE-II

Bipolar junction Transistors

**BJT configuration**: BJT Operation, BJT voltages and currents, BJT amplification, Common Base, Common Emitter, Relation between α and β, Common Collector Characteristics.

Numerical examples as applicable.

**08 - Hours**

**MODULE-III**

**Digital Electronics and Number Systems**

**Digital Electronics:** Introduction, Switching and Logic Levels, Digital Waveform. Number Systems: Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System.

**Number base conversions:** Binary to Decimal, Decimal to Binary, Binary to Octal, Octal to Binary, Binary to Hexadecimal, Hexadecimal to Binary, Decimal to Octal, Octal to Decimal, Decimal to Hexadecimal, Hexadecimal to Decimal, Octal to Hexadecimal, Hexadecimal to octal. Complement of Binary Numbers, Binary addition, Binary subtraction. Boolean Algebra Theorems, De Morgan's theorem,.

**Logic gates:** Basic and Universal gates. Algebraic Simplification and Implementation of Digital circuits using Basic & Universal Gates. Half adder and Full adder Implementations.

**10- Hours**

**MODULE-IV**

**Special Devices &Actuators**

Construction of Working principles of LED, Seven Segment Display, Photo conductive cells, Photo transistors, Opto couplers, Relays.

**06 - Hours**

**MODULE-V**

**CommunicationSystems**

Introduction, Block diagram of communication system, Modulation, Demodulation, Different types of modulation.

**06- Hours**

**Course Outcomes:**

On completion of this course the student will be able to:

| CO # | Course Outcomes |
|---|---|
| CO 1 | Explain and analyze the application of diodes as rectifiers. |
| CO 2 | Understand and analyze the transistor biasing circuits based on characteristics of various BJT configurations. |
| CO 3 | Understand number system conversions and design basic digital circuits using logic gates. |
| CO 4 | Operate various special devices, actuators according to their applications. |
| CO 5 | Understand the principles of communication system and analyze various modulation techniques. |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 | PSO.1 | PSO.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | **3** | **2** | - | - | - | - | - | - | - | - | - | - | **3** | - |
| CO2 | **3** | **3** | - | - | - | - | - | - | - | - | - | - | **3** | - |
| CO3 | **3** | **3** | **3** | - | - | - | - | - | - | - | - | - | **3** | - |
| CO4 | **3** | - | - | - | - | - | - | - | - | - | - | - | **3** | - |
| CO5 | **3** | - | - | - | - | - | - | - | - | - | - | - | **3** | - |

**Question Paper Pattern:**

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books:


1. David A. Bell, "**Electronic Devices and Circuits**", Oxford University Press, 5th Edition, 2008.

2. D.P. Kothari, I. J. Nagrath, "**Basic Electronics**", McGraw Hill Education (India) Private Limited, 2014.

3. George Kenedy, Bernard Davis " **Electronics and Communication System",** 3rd edition.


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# ELEMENTS OF MECHANICAL ENGINEERING

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

| | |
|---|---|
| **Course Code : 18**MES14/24 | **CIE Marks : 50** |
| **Contact Hours/Week : 03** | **SEE Marks: 50** |
| **Total Hours: 38** | **Exams. Hours: 03** |
| **Semester: I/II** | **Credits: 03** |

**Course Objectives:** This course will enable students to

- Understand the working principle of boilers, refrigeration and air conditioning.
- Understand the basics of steam & gas turbines and IC engines.
- Understand the joining and manufacturing processes through machine tools.
- Understand the basics of various means of power transmission.
- Understand the conversion of energy sources and biofuels.

**MODULE 1:**

Steam Formation and Properties: Classification of boilers, Lancashire boiler, Babcock and Wilcox boiler, boiler mountings and its accessories. Basics of refrigeration and air conditioning. Working principle vapor compression and vapor absorption refrigeration systems and its applications.

**08- Hours**

**MODULE 2:**

Steam turbines: Classification of steam turbine, Principle of operation of Impulse and reaction turbines, Gas Turbines: Classification of gas turbine, working principles (Open cycle and closed cycle gas turbines). Water turbines: Classification of water turbine and their working principles. Internal Combustion Engines: Classification of IC engines, I.C. Engine terminologies, 2 Stroke and 4 stroke Petrol & diesel engines& simple numerical.

**08 - Hours**

**MODULE 3:**

Joining processes: Soldering, Brazing and Welding: Definitions, classification and method of soldering, Brazing and welding.

Machine Tools and Operations :Lathe , drilling and milling machines, Turning, facing, knurling, Thread cutting, Taper Turning methods, Drilling, Boring, Reaming, Tapping, Counter Sinking, Counter Boring, -Plane milling, End milling, Slot milling.

**08 - Hours**

**MODULE 4:**

Power Transmission: Belt Drives - Classification and applications.

Gears - Definitions, Terminology, types and uses. Gear Drives and Gear Trains – Definitions and classifications, simple numerical

**06- Hours**

**MODULE 5:**

Energy Resources: Non-renewable and renewable energy resources, Petroleum based solid, liquid and gaseous fuels, Combustion and combustion products of fuels, Solar Power: Solar Radiation, Solar constant (definition only), Solar Thermal energy harvesting, solar photovoltaic principle. Wind Power: principle of operation of a typical windmill. Hydro Power: Principles of electric power generation from hydro power plants, Nuclear Power: Principles of Nuclear power plants, Bio Fuels: introduction to bio fuels.

**08 - Hours**

**Course Outcome:**

| | |
|---|---|
| **CO.1** | Acquire the knowledge of steam formation and its application. Also gain basic understanding of refrigeration systems. |
| **CO.2** | Understand and analyze the working principle, operation and application of prime movers. |
| **CO.3** | Demonstrate the methods and operations of metal removal process using Lathe, drilling, Milling. |
| **CO.4** | Design and analyze the power transmission systems along with its Implementations. |
| **CO.5** | Explore the knowledge of various Non-conventional Energy sources. |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 | PSO.1 | PSO.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| CO2 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| CO3 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| CO4 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| CO5 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | - |

## Question Paper Pattern:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question carries 20 marks.
4. There will be two full questions (with a maximum of four sub questions) from each module
5. Each full question will have sub questions covering all the topics under a module.
6. The students will have to answer five full questions, selecting one full question from each module.

**Text Books:**


1. V.K.Manglik, "Elements of Mechanical Engineering", PHI Publications, 2013. (unit-1,2,4,5).
2. K.R.Gopalkrishna, "A text Book of Elements of Mechanical Engineering"- Subhash Publishers, Bangalore. (Unit -1,2,3,4,5)


**Reference Books:**


1. S.TrymbakaMurthy, "A Text Book of Elements of Mechanical Engineering", 4th Edition 2006, Universities Press (India) Pvt Ltd, Hyderabad.
2. K.P.Roy, S.K.HajraChoudhury, Nirjhar Roy, "Elements of Mechanical Engineering", Media Promoters & Publishers Pvt Ltd,Mumbai,7th Edition,2012


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# BASIC ELECTRICAL ENGINEERING

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

**Course Code : 18ELE14/24** **CIE Marks : 50**
**Contact Hours/Week : 03** **SEE Marks: 50**
**Total Hours: 38** **Exams. Hours: 03**
**Semester: I/II** **Credits: 03**

**Course Learning Objectives**:

- Impart a basic knowledge of electrical quantities such as current, voltage, power energy and frequency to understand the impact of technology in a global and societal context.
- Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
- Develop selection skill to identify the type of generators or motors required for particular application.
- Highlight the importance of transformers in transmission and distribution of electric power.
- Emphasize the effects of electric shock and precautionary measures.
- Improve the ability to function on multi-disciplinary teams.

**MODULE 1:**

**DC Circuits**

Electrical circuit elements (R, L and C), voltage and current sources (Ideal and practical), Kirchhoff current and Voltage laws, analysis of simple circuits with dc excitation.

**08 - Hours**

**MODULE 2:**

**AC Circuits**

Representation of sinusoidal waveforms, peak, average value and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC series circuts.

**08 - Hours**

**MODULE 3:**

a) **Single Phase transformer:**

Ideal and practical transformer, construction and working principle, losses in transformers, regulation and efficiency. Auto-transformer.

b) **Three phase Induction Motors:**

Construction, Rotating Magnetic field, working principle and types of three phase induction motors, slip and its importance. **08 - Hours**

**MODULE 4:**

**Measuring Instruments:**

Types of meters: voltmeter, Ammeter, Wattmeter, Rheostat , Multimeter and construction and working of single phase energymeter**.**

**08- Hours**

**MODULE 5:**

**Domestic Wiring**

Types of Wirings, Fuses, Earthing and its types. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption.

**06 - Hours**

**Course Outcome:**
On completion of this course the student will be able to:

| **CO #** | **Course Outcomes** |
|---|---|
| **CO 1** | Analyze simple circuits with DC excitation using Kirchhoff's Laws. |
| **CO 2** | Analyze simple series circuits with single phase AC excitation. |
| **CO 3** | Explain the generation of three-phase power and analyze three-phase circuits |
| **CO 4** | Explain the Construction and Working of Single-phase Transformer |
| **CO 5** | Explain measurement of power and energy and also personal safety measures. |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/ PO | PO. 1 | PO. 2 | PO. 3 | PO. 4 | PO. 5 | PO. 6 | PO. 7 | PO. 8 | PO. 9 | PO. 10 | PO. 11 | PO. 12 | PSO. 1 | PSO. 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | | | | | | | | | | | | |
| CO2 | 3 | 3 | | | | | | | | | | | | |
| CO3 | 3 | 3 | | | | | | | | | | | | |
| CO4 | 3 | 3 | | 2 | | | | | | | | | | |
| CO5 | 3 | | | | | 3 | | | | | | | | |

## Question Paper Pattern:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.

- There will be two full questions (with a maximum of four sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

**Reference Books**


1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.


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## PROGRAMMING FOR PROBLEM SOLVING

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

| | |
|---|---|
| **Course Code : 18PPS15/25** | **CIE Marks : 50** |
| **Contact Hours/Week : 03** | **SEE Marks: 50** |
| **Total Hours: 38** | **Exams. Hours: 03** |
| **Semester: I/II** | **Credits: 03** |

**Course Learning Objectives**: This course will enable students to

- To familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.

- To implement different programming constructs and decomposition of problems into functions.
  - To use and implement data structures like arrays and structures to obtain solutions.
  - To define and use of pointers with simple applications.

**MODULE 1:**

**Introduction to Programming:** Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.).
**Idea of Algorithm:** steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples.
Overview of C: Basic Structure of C Programs, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code, Arithmetic operators, expressions and precedence.

**10 - Hours**

**MODULE 2:**

**Managing input and output operations**
**Conditional Branching and Loops**: Writing and evaluation of conditionals and consequent branching. Iteration and loops, Finding roots of quadratic equations.

**07 - Hours**

**MODULE 3:**

**Arrays:** Arrays (1-D, 2-D), Character arrays and Strings
**Basic Algorithms**: Searching, Basic sorting algorithms (Bubble, Insertion and Selection), Programs on strings , notion of order of complexity through example programs (no formal definition required)

**07 - Hours**

**MODULE 4:**

**Function**: Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference.
**Recursion**: Recursion, as a different way of solving problems. Comparison of programs with recursion and iterative for finding factorial, Fibonacci series etc.

**07- Hours**

**MODULE 5:**

**Structure:** Structures, Defining structures and Array of Structures
**Pointers**: Idea of pointers, Defining pointers, Use of Pointers in self referential structures, notion of linked list (no implementation)

**07 - Hours**

**Course Outcome:** The students shall able to:

| | |
|---|---|
| **CO1** | Understand the basics of computers, analyze a problem and implement an algorithm to solve it. |
| **CO2** | Design problem solution with programs using the concepts of conditional and branching statements. |
| **CO3** | Apply the concepts of arrays for storing and retrieving the data. |
| **CO4** | Able to understand functions and use to solve common programming problems |
| **CO5** | Implement programs by using derived data types and pointers. |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 | PSO.1 | PSO.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | | | | | | | | | | 1 | 2 | 3 |
| CO2 | 3 | 1 | 1 | | 3 | | | | | | | | 1 | 3 |
| CO3 | 1 | 2 | 1 | | 2 | | | | | | | 1 | 1 | 3 |
| CO4 | 2 | 2 | 1 | | 3 | | | | | | | 1 | 1 | 3 |
| CO5 | 2 | | 2 | | 2 | | | | | | | | 1 | 3 |

**Question Paper Pattern:**

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

**Text / Reference Books:**


1. **Brian W. Kernighan and Dennis M. Ritchie:** The C Programming Language, Prentice Hall of India.
2. **E. Balaguruswamy:** Programming in ANSI C, Tata McGraw-Hill
3. **Vikas Gupta:** Computer Concepts and C Programming, Dreamtech Press 2013.
4. **R S Bichkar:** Programming with C, University Press, 2012.
5. **Jacqueline Jones and Keith Harrow:** Problem Solving with C, 1st Edition, Person 2011
6. Behrouz A. Forouzan, Richard F. Gilberg: Computer Science - A Structured Approach Using C, 3 rd Edition, Cengage Learning, 2007.


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# COMPUTER AIDED ENGINEERING DRAWING

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

**Course Code : 18CADL15/25** **CIE Marks : 50**
**Contact Hours/Week : 04(1T+4L)** **SEE Marks: 50**
**Total Hours: 50** **Exams. Hours: 03**
**Semester: I/II** **Credits: 03**

**Course Learning Objectives**:

- Engineering drawing is an important tool for all Engineers and for many others professionals.
- It is the language of Engineers. Engineering Drawing communicates all needed information from the engineer who designed a part to the workers who will manufacture it.
- The aim of the subject is to equip students with the fundamentals of Computer Aided Engineering Drawing and to further the ability to communicate information by graphical means.

**MODULE 1:**

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Selection of drawing size and scale 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. Various types/methods of projections, Definitions of HP, VP, RPP & LPP., First and Third angle systems of orthographic projections. Projection of Points in different quadrants. Projections of Straight Lines – parallel to one or both reference planes, contained by one or both planes, perpendicular to one of the planes, inclined to one plane but parallel to the other planes, inclined to both the planes, true length of a line and its inclination with reference planes, traces of a line.

**10 - Hours**

**MODULE 2:**

Projections of Planes – parallel to one reference plane, inclined to one plane but perpendicular to the other, inclined to both reference planes.

**08 - Hours**

**MODULE 3:**

Projections of Polyhedra Solids and Solids of Revolution - in simple positions with axis perpendicular to a plane, with axis parallel to one and inclined to other . axis inclined to both planes. Projections of of Prisms, Pyramids, Cylinders and Cones.

**12 - Hours**

**MODULE 4:**

Isometric views and isometric projections - introduction, isometric scale, Isometric views of plane figures, prisms, pyramids and cylinders. Free Hand Sketching - Orthographic Views from Isometric.

**10 - Hours**

**MODULE 5:**

Development of Lateral Surfaces 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).

**10 - Hours**

**Course Outcome:**

At the end of this course students are able to,

| | |
|---|---|
| **CO. 1** | Students will be able to understand the basic principles and conventions of engineering drawing to Analyze and draw the projections of points & lines |
| **CO. 2** | Students will be able to Analyze and draw the orthographic projection of planes |
| **CO. 3** | Students will be able to understand the projection concepts in solids and apply concepts in the area of design |
| **CO. 4** | Students will be able to visualize the components by isometric projection. |
| **CO. 5** | Identify the interdisciplinary engineering components or systems through its graphical representation. |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 | PSO.1 | PSO.2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | **3** | **2** | - | - | **3** | **1** | - | **1** | **1** | **3** | - | **3** | 1 | 1 | - |
| CO2 | **3** | **2** | - | - | **3** | **1** | - | **1** | **1** | **3** | - | **3** | 1 | 2 | - |
| CO3 | **3** | **3** | - | - | **3** | **1** | **1** | - | **1** | **3** | - | **3** | 1 | 1 | - |
| CO4 | **3** | **2** | - | - | **3** | - | - | - | **1** | **3** | - | **3** | 1 | 1 | - |
| CO5 | **3** | **2** | - | - | **3** | - | - | - | **1** | **3** | - | **3** | 2 | 1 | 1 |

## Question Paper Pattern:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

**Text Books:**


1. Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48th edition, 2005- Charotar Publishing House, Gujarat.
2. Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore
3. **"**Computer Aided Engineering Drawing" by Dr. M H Annaiah, Dr C N Chandrappa and Dr B Sudheer Premkumar Fifth edition, New Age International Publishers.


**Reference Books:**


1. Computer Aided Engineering Drawing - S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition- 2006.
2. 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.


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| ENGINEERING PHYSICS LABORATORY | | | |
|---|---|---|---|
| **Course Code** | **18PHYL16/26** | **CIE Marks** | **50** |
| **Teaching Hours/Week(L:T:P:S)** | **0:0:2:0** | **SEE Marks** | **50** |
| **Credits** | **2** | **Exam Hours** | **3 Hours** |

**Course objectives:**

This course (18PHYL16/26) Will enable to

1. To realize experimentally, the mechanical, electrical and thermal properties of materials, concept of waves and oscillations.
2. Construct simple circuits and hence study the characteristics of semiconductor device.

**List of Experiments: Any Ten Experiments to be performed**

| Sl. NO | Experiments |
|---|---|
| 1 | Determination of rigidity modulus of the material by the torsional pendulum. |
| 2 | To study the reverse bias characteristics in Zener diode. |
| 3 | Stefan's law of radiation. |
| 4 | Young's modulus of a beam by single cantilever experiment. |
| 5 | Spring constant in series and parallel combination. |
| 6 | Determine acceptance angle & numerical aperture of an optical fiber. |
| 7 | Determine wave length of semiconductor laser using laser diffraction by calculating grating constant. |
| 8 | Estimation of Fermi energy of copper. |
| 9 | Study of input & output transistor characteristics & hence calculate input resistance & output resistance. |
| 10 | I-V characteristics of a photo diode. |
| 11 | Calculation of dielectric constant by RC-Charging and discharging. |
| 12 | Determination of spring constant in series and parallel combination. |

**COURSE OUTCOMES:**

1. Demonstrate the theoretical concepts of engineering physics through series of laboratory experiments.
2. Develop the experimental skill of small team work for operating equipments and collecting data.
3. Determine the properties on optical, electrical, electronics, modern physics and material science experiments.
4. Analyze the data and interpret the results.
5. Prepare a well organized laboratory report.

**Internal assessment for the practical component**

On completion of every experiment in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.
The 35 marks are divided as, for conducting the experiment 21 and 14 marks for preparation of the laboratory record, individual evaluation (which includes viva voce), (the average of total experiments)
The 15 marks shall be for the test conducted at the end of the semester, for the subject (duration of 1 hour 30 minutes)

**SEE for the practical component**

- SEE marks for the practical course is 50 marks
- All laboratory experiments are to be included for the practical exam
- Break up marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners
- Students can pick one question (experiment) from the questions lot prepared by the examiners
- General rubrics suggested for SEE are mentioned here, 15% write up, 70% for conduction, procedure and results and 15% for viva voce of maximum marks.
- Practical SEE will be conducted by University as per the scheduled time table, for the subject **(duration 03 hours)**

**COs and POs Mapping**

| Cos | Pos | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| CO1 | 3 | 2 | | | | | | | 3 | | | 1 |
| CO2 | 3 | 2 | | | | | | | 3 | | | 1 |
| CO3 | 3 | 2 | | | | | | | 3 | | | 1 |
| CO4 | 3 | 2 | | | | | | | 3 | | | 1 |
| CO5 | 3 | 2 | | | | | | | 3 | | | 1 |
| Avg | 3 | 2 | | | | | | | 3 | | | 1 |

**Level 3 - Highly Mapped, Level 2- Moderately Mapped, Level 1 – Low Mapped**

**Note:** The CO-PO mapping values are indicative. The course coordinator can alter the mapping using Competency and performance Indicators mentioned in the AICTE Exam

**Suggested Learning Resources:**

**Reference books.**

1. Engineering Lab Manual by WBUT-New Age International Publishers.
2. Applied Physics Lab Manual by Anoop Sing Yadav.

**Weblinks, Video lectures, and e-resources.** https://vlab.amrita.edu/?sub=1&brch=282&sim=1512&cnt=1https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of

%20experiments.htmlhttps://virtuallabs.merlot.org/vl_physics.html
https://phet.colorado.eduhtt
ps://www.myphysicslab.com

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# ENGINEERING CHEMISTRY LAB

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

| | |
|---|---|
| **Course Code :18CHEL16/26** | **CIE Marks : 50** |
| **Contact Hours/Week : 02** | **SEE Marks: 50** |
| **Total Hours: 38** | **Exams. Hours: 03** |
| **Semester: I/II** | **Credits: 01** |

**Course objectives:**

**Course objectives:** To provide students with practical knowledge of

- Quantitative analysis of materials by classical methods of analysis.
- Instrumental methods for developing experimental skills in building technical competence.

**Instrumental Experiments**

1. Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2. Conductometric estimation of acid mixture.
3. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.

4. Colorimetric estimation of Copper .
5. Determination of pKa of the given weak acid using pH meter.
6. Flame photometric estimation of sodium and potassium.
7. Determine the surface tension of a given liquid at room temp using stalgmometer by drop number method.

**Volumetric Experiments**

1. Estimation of Total hardness of water by EDTA complexometric method.
2. Estimation of CaO in cement solution by rapid EDTA method.
3. Determination of percentage of Copper in brass using standard sodium thiosulphate solution.
4. Determination of COD of waste water.
5. Estimation of Iron in haematite ore solution using standard $K_2Cr_2O_7$ solution by external indicator method.
6. Estimation of percentage of available chlorine in the given sample of bleaching powder (Iodometric method)
7. Determination of chloride content of water by Iodometric method

**Course outcomes:**

On completion of this course, students will have the knowledge in

| | |
|---|---|
| **CO1** | Principles and Procedure. (Knowledge |
| **CO2** | Understanding the Reactions. (Comprehension) |
| **CO3** | Applications |
| **CO4** | Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results. (Analysis) |
| **CO5** | Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results. (Synthesis) |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 2 | | | | | | | 3 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2 | 3 | | | | 3 | | | | | | | 3 |
| CO3 | 3 | | | | 3 | | | | | | | 3 |
| CO4 | 3 | | | | 3 | | | | | | | 3 |
| CO5 | 3 | | | | 1 | | | | | | | 3 |

**Conduction of Practical Examination**:

a. Examination shall be conducted for 100 marks, later reduced to 60 marks.
b. All experiments are to be included for practical examination.
c. One instrumental and another volumetric experiment shall be set.
d. Different experiments shall be set under instrumental and a common experiment under volumetric.

**Reference Books**:

1. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, "Vogel's Text Book of Quantitative Chemical Analysis"
2. O.P. Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age International Publishers.
3. Gary D. Christian, "Analytical chemistry", 6th Edition, Wiley India.

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# COMPUTER PROGRAMMING LAB

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

**Course Code : 18CPL17/27** **CIE Marks : 50**
**Contact Hours/Week : 02** **SEE Marks: 50**
**Total Hours:38** **Exams. Hours: 03**
**Semester: I/II** **Credits: 01**

**Course Learning Objectives**:

This course will enable students to

- Familiarize to use word, excel and power point presentations.
- To practice writing flowcharts, algorithms and programs.
- To implement basics of C programming language.
- To provide solutions to the laboratory programs.
- To familiarize the processes of debugging and execution.

**Descriptions (if any):**

- The laboratory should be preceded or followed by a tutorial to explain the algorithm and logical approach to be implemented for the problems given and real life application.

- Every experiment should have algorithm and flowchart be written before writing the program.
- Ensure that no built-in functions are used.
- Code should be traced minimum two test cases which should be recorded.
- Students should have prerequisite knowledge of basic mathematics and vectors.

PART-A

1. Computer Office Applications
   - Working with MS Access.
   - Working with MS Word.
   - Working with Power point.
2. Familiarization with programming environment, concept of naming the program files, storing, compilation, execution and debugging. Taking any simple C- code.
3. Simple computational problems using arithmetic expressions and use of each operator leading to implementation of a Commercial calculator.
4. Problems involving if-then-else structures. Implement different ways of finding the largest of given three positive integers.
5. Problems Solving using looping statements.

PART-B

1. Introduce Iterative problem solving and implement Taylor series approximation to compute Sin(x) or polynomial.
2. Introduce 1D/2D Array manipulation and implement bubble sort technique.
3. Implement Matrix multiplication and ensure the rules of multiplication are checked.
4. Use functions to check whether the given string is a Palindrome. Convince the parameter passing techniques.
5. Implement structures to read, write, compute average- marks and the students scoring Above and below the average marks for a class of 60 students.
6. Implement addition of array elements using Pointers.
7. Implement Recursive functions, namely, GCD and Binary to Decimal Conversion.
8. Implement a C program to maintain a record of "n" student details using an array of structures with four fields (Roll number, Name, Marks, and Grade). Each field is of an appropriate data type. Print the marks of the student given student name as input.

**Course Outcomes:**

The students shall able to:

| | |
|---|---|
| CO1 | Demonstrate theoretical concepts of C language through series of experiments |
| CO2 | Develop the program using software tools |
| CO3 | Debug and troubleshoot software issues effectively |
| CO4 | Analyze the data and interpret the results |
| CO5 | Prepare a well-organized laboratory report |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 | PSO.1 | PSO.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | | | | | | | | | | 1 | 1 | 3 |
| CO2 | 3 | 2 | 3 | | 1 | | | | | | | 1 | 1 | 3 |
| CO3 | | 2 | | | 1 | | | | | | | 1 | 1 | 3 |
| CO4 | 2 | | 2 | | | | | | | | | | 1 | 3 |
| CO5 | 1 | | | | | | | | | 3 | | | 1 | 3 |

**Question paper pattern:**

- All laboratory experiments are to be included for practical examination.
- Part A – 20 Marks and Part B – 30 Marks.
- Students are allowed to pick one experiment from part A and one experiment part B.
- Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
  - Change of experiment is allowed only once and 15% Marks is deducted from the procedure part.

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# ELECTRONICS AND ELECTRICAL LAB

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

**Course Code : 18EECL17/27** **CIE Marks : 50**
**Contact Hours/Week : 02** **SEE Marks: 50**
**Total Hours:38** **Exams. Hours: 03**
**Semester: I/II** **Credits: 01**

**Course Learning Objectives**:

1. To establish a broad concept of various types of electrical circuits , tools and instrumentation.
2. To measure power & power factor measurement of different types of lamps.
3. To provide hands on experience with electrical circuits and electrical safety norms.
4. To train students to read and understand schematics so as to make electrical connections for different appliances.
5. To measure frequency, time & voltage levels of various waveforms.
6. To train the students to understand the truth table of various logic gates.

**PART –A**

**Course Contents: ELECTRICAL LABORATORY**

**LIST OF EXPERIMENTS**

1. To verify KCL and KVL
2. To study the V-I characteristics of an incandescent lamp.
3. To measure single phase power by using voltmeter, ammeter and wattmeter method.
4. Calibration of single phase energy meter.

**Demonstration Experiments (for CIE only):**

1. Introduction to Electrical tools and Electronics components.
2. Home electrical wiring demonstration:
   i) Tube light wiring.
   ii) Fan wiring.
   iii) Two way control

**PART –B**

**Course Contents : ELECTRONICS LABORATORY**

1. Measurement of the following using CRO.
   a) Frequency/ Time measurement of sine and square wave.
   b) AC and DC voltages
   c) Component testing(Diode & Transistor)
2. Study of characteristics of PN junction diode.
3. Implementation of halfwave ,full wave and bridge rectifiers.
4. Study of CB, CE transistor characteristics.
5. Realization of logic gates using IC's.

**Course Outcomes:**

On completion of this course students will be able to:

| | |
|---|---|
| CO1 | Establish a broad concept of various types of electrical circuits, tools and instrumentation |
| CO2 | Measure power & power factor of different types of lamps. |
| CO3 | Obtain the characteristics of PN junction diode, CB and CE transistors |
| CO4 | Measure frequency, time and voltage levels of various waveforms. |
| CO5 | Realize various logic gates using IC's. |

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**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/ PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 | PSO.1 | PSO.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | | | | | 3 | | | 1 | 3 | 3 |
| CO2 | 3 | 3 | 2 | 2 | | | | | 3 | | | 1 | 3 | 3 |
| CO3 | 3 | 3 | 2 | 2 | | | | | 3 | | | 1 | 3 | 3 |
| CO4 | 3 | 3 | 2 | 2 | | | | | 3 | | | 1 | 3 | 3 |
| CO5 | 3 | 3 | 2 | 2 | | | | | 3 | | | 1 | 3 | 3 |

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# PROFESSIONAL COMMUNICATION LAB

**[As per Choice Based Credit System (CBCS) scheme]**

**(Effective from the Academic Year 2018-19)**

**Course Code : 18CPL18/28** **CIE Marks : 50**

**Contact Hours/Week : 02** **SEE Marks: 50**

**Total Hours:38** **Exams. Hours: 02**

**Semester: I/II** **Credits: 01**

**Course Learning Objectives**: The course (18EGH18) will enable the students ,

- To impart basic English grammar and essentials of language skills
- To train to identify the nuances of phonetics, intonation and enhance pronunciation skills
- To enhance with English vocabulary and language proficie

**Language Lab**

For augment LSRW and GV skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred.

**MODULE 1:**

**Introduction to Technical Communication**

Fundamentals of Technical Communication Skills, Barriers to Effective Communication, Different styles in Technical Communication. Interpersonal Communication Skills, How to improve Interpersonal Communication Skills, Developing Interpersonal Skills.

Grammar : Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Articles, Conjunctions. **RBT Levels : L1, L2 & L3**

**10 - Hours**

**MODULE 2:**

**Introduction to Listening Skills and Phonetics – I**

Introduction to Phonetics, Sounds Mispronounced, Silent and Non silent Letters, Homophones and Homonyms, Aspiration, Pronunciation of ' *The*', words ending ' *age'* , some plural forms.

Articles: Use of Articles – Indefinite and Definite Articles. **RBT Levels : L1, L2 & L3**

**08 - Hours**

**MODULE 3:**

**Developing Listening Skills (Phonetics and Vocabulary Building) - II**

Speech Sounds: Vowels and Consonants - Exercises on it. Preposition, kinds of Preposition and Prepositions often Confused. Word Accent – Rules fo r Word Accent, Stress Shift, Question Tags, Question Tags for Assertive sentences (statements)- some exceptions in question tags and exercise in One Word Substitutes and Exercises.

Vocabulary – Synonyms and Antonyms, Exercises on it . **RBT Levels : L1, L2 & L3**

**12 - Hours**

**MODULE 4:**

**Speaking Skills (Grammar and Vocabulary) – I**

Syllables, Structures, Strong and Weak forms of words, Words formation - Prefixes and Suffixes (Vocabulary), Contractions and Abbreviations.

Spelling Rules and Words often Misspelt – Exercises on it. Word Pairs (Minimal Pairs) – Exercises, The Sequence of Tenses ( Rules in use of Tenses) and Exercises on it. **RBT Levels : L1, L2 & L3**

**10 - Hours**

**MODULE 5:**

**Speaking Skills (Grammar and Vocabulary) – II**

Extempore/Public Speaking, Difference between Extempore/Public Speaking, and Guidelines for Practice.

Mother Tongue Influence(MTI) – South Indian Speaker s, Various Techniques for Neutralisation of Mother Tongue Influence – Exercises, Listening Com prehension – Exercises. Information Transfer : Oral Presentation - Examples. Common Errors in Pronunciation. **RBT Levels : L1, L2 & L3**

**10 – Hours**

**Course Outcome:**

**On completion of the course, students will be able to:**

| | |
|---|---|
| CO1 | Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronunciation |
| CO2 | Implement English vocabulary at command and language proficiency. |
| CO3 | Identify common errors in spoken and written communication |
| CO4 | Understand and improve the non verbal communication and kinesics |
| CO5 | Perform well in campus recruitment, engineering and all other general competitive examinations |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | 1 | 3 | 3 | | 1 |
| CO2 | | | | | | | | 1 | 3 | 3 | | 1 |
| CO3 | | | | | | | | 0 | 2 | 2 | | 1 |
| CO4 | | | | | | | | 0 | 2 | 1 | | 1 |
| CO5 | | | | | | | | 0 | 2 | 3 | | 1 |

**Question paper pattern**

The SEE question paper will be set for 100 marks and the pattern of the question paper will be objective type (MCQ).

**Text Books**

- **Communication Skills** by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018. **Refer it's workbook** for activities and exercises – "Communication Skills – I (A Workbook)" published by Oxford University Press – 2018.

- **English Language Communication Skills – Lab Manual cum Workbook,** Cengage learning India Pvt Limited [Latest Revised Edition] – 2018.

**Reference Books**


I. **Practical English Usage** by Michael Swan, Oxford University Press – 2016.

II. **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd – 2015.

III. **English for Technical Communication** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2016.

IV. **Technical Communication** by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2018.

V. **Effective Technical Communication** – Second Edition by M. Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.


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# ENVIRONMENTAL STUDIES

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the Academic Year 2018-19)**

**Course Code : 18ES18/28** **CIE Marks : 50**
**Contact Hours/ Week : 01** **SEE Marks: 50**
**Total Hours: 25** **Exams. Hours: 01**
**Semester: I/II** **Credits: 01**

**Course Learning Objectives**:

- **To identify the major challenges in environmental issues and evaluate possible solutions.**
- **Develop analytical skills, critical thinking and demonstrate socio-economic skills for sustainable development.**
- **To analyze an overall impact of specific issues and develop environmental management plan.**

**MODULE 1:**

Introduction: Environment - Components of Environment Ecosystem: Types & Structure of Ecosystem, Balanced ecosystem Human Activities – Food, Shelter, And Economic & Social Security.

Impacts of Agriculture & Housing Impacts of Industry, Mining & Transportation

Environmental Impact Assessment, Sustainable Development.

**5 Hours**

**MODULE 2:**

Natural Resources, Water resources – Availability & Quality aspects, Fluoride problem in drinking water Mineral resources, Forest Wealth Material

Environmental Acts & Regulations, Role of government, Legal aspects, Role of Non-governmental Organizations (NGOs) , Environmental Education & Women Education.

**5 Hours**

**MODULE 3:**

Energy – Different types of energy, Conventional so urces & Non Conventional sources of energy Solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy.

**5 Hours**

**MODULE 4:**

Environmental Pollution – Water Pollution, Noise po llution, Land Pollution, Public Health Aspects.

Global Environmental Issues: Population Growth, Urbanization, Land Management, Water & Waste Water Management.

**5 Hours**

**MODULE 5:**

Air Pollution & Automobile Pollution: Definition, Effects – Global Warming, Acid rain &Ozone layer depletion, controlling measures.

Solid Waste Management, E - Waste Management & Biomedical Waste Management - Sources, Characteristics & Disposal methods.

**5 Hours**

**Course Outcome:**

Students will be able to,

| CO# | Course Outcomes |
|---|---|
| CO1 | Understand the principles of ecology and environmental issue that apply to air, land and water issue on a global scale. |
| CO2 | Develop critical thinking and /or observation skills and apply them to the analysis of a problem or question related to the environment |
| CO3 | Demonstrate ecology knowledge of a complex relationship between biotic and abiotic component. |
| CO4 | Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues |
| CO5 | Impact Assessment and laws of environment protection Act. |

**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 | PSO.1 | PSO.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | 2 | | | | | | 2 | |
| CO2 | | | | | | | 2 | | | | | | 2 | |
| CO3 | | | | | | | 2 | | | | | | 2 | |
| CO4 | | | | | | | 2 | | | | | | 2 | |
| CO5 | | | | | | | 2 | 2 | | | | | 2 | |

**Text Books:**


1. Benny Joseph (2005), "Environmental Studies", Tata McGraw – Hill Publishing Company Limited.
2. R.J.Ranjit Daniels and Jagadish Krishnaswamy, (2009), "Environmental Studies", Wiley India Private Ltd., New Delhi.
3. R Rajagopalan, "Environmental Studies – From Crisis to Cure", Oxford University Press, 2005,
4. Aloka Debi, "Environmental Science and Engineering", Universities Press (India) Pvt. Ltd. 2012.


**Reference Books:**


1. Raman Sivakumar, "Principals of Environmental Science and Engineering", Second Edition, Cengage learning Singapore, 2005
2. P. Meenakshi, "Elements of Environmental Science and Engineering", Prentice Hall of India Private Limited, New Delhi, 2006
3. S.M. Prakash, "Environmental Studies", Elite Publishers Mangalore, 2007
4. Erach Bharucha, "Text Book of Environmental Studies", for UGC, University press, 2005
5. G.Tyler Miller Jr., "Environmental Science – working with the Earth", Tenth Edition, Thomson Brooks /Cole, 2004
6. G.Tyler Miller Jr., "Environmental Science – working with the Earth", Eleventh Edition, Thomson Brooks /Cole, 2006
7. Dr.Pratiba Sing, Dr.AnoopSingh and Dr.Piyush Malaviya, "Text Book of Environmental and Ecology", Acme Learning Pvt. Ltd. New Delhi.


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# ENGINEERING MATHEMATICS-II

**(Common to all branches)**

**[As per Choice Based Credit System (CBCS) scheme]**
**(Effective from the academic year 2018-19)**

**Course Code : 18MAT21** **CIE Marks : 50**
**Contact Hours/Week : 04** **SEE Marks: 50**
**Total Hours:50** **Exam Hours:03**
**Semester : II** **Credits: 04**

**Course Learning Objectives:**

This course viz., Advanced Calculus and Numerical Methods (18MAT21) aims to prepare the students:

- To familiarize the important tools of vector calculus, ordinary/partial differential equations and power series required to analyze the engineering problems.
- To apply the knowledge of interpolation/extrapolation and numerical integration technique whenever analytical methods fail or very complicated, to offer solutions.

**MODULE-I**

**Differential Equation-1:-**
Solution of non-linear differential equation of first order : Solvable for p, x , y and Clairaut's equation. Solution of second and higher order Ordinary linear differential equation with constant co-efficients, Inverse Differential operator method.

**10 - Hours**

**MODULE-II**

**Differential Equations-2:-** Method of variation of parameters. Solution of second & higher order Ordinary linear differential equation with variable co-efficients: Cauchy Differential Equation and Legendre's Differential equation. Solution of homogeneous LDE by Power series solution Method.

**10 - Hours**

**MODULE-III**

**Partial Differential Equations(PDE's):-** Solution of Non-homogeneous PDE by direct integration, solution of homogeneous PDE with respect to one independent variable only.

Derivation of one dimensional wave equation and heat equation and solution by methods of separation of variables.

**10 - Hours**

**MODULE-IV**

Complex valued function, limit, continuity, differentiability, analytic functions. Cauchy-Riemann Equation in Cartesian, Polar form. Harmonic and orthogonal property and problems.
Vector Differentiation: Scalar and Vector point functions, Gradient, Divergence, Curl, Laplacian operator and problems. Solenoidal, Irrotational motion.

**10 - Hours**

**MODULE-V**

Vector line integral, Vector Surface integral: Greens theorem, Stokes theorem. Volume Integral: Gauss divergence theorem.
Improper Integrals: Beta and gamma functions and its properties and examples.

**10 – Hours**

**Text Books:**

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

**Reference books:**

1. C.Ray Wylie, Louis C.Barrett : “Advanced Engineering Mathematics", 6th Edition,
2. McGraw-Hill Book Co., New York, 1995. 2. James Stewart : “Calculus –Early Transcendentals”, Cengage Learning India Private Ltd., 2017.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Srimanta Pal & Subodh C. Bhunia: “Engineering Mathematics”,Oxford University Press,3rd Reprint,2016.
5. Gupta C.B., Singh S.R. and Mukesh Kumar: “Engineering Mathematics for Semester I & II”, Mc-Graw Hill Education (India) Pvt.Ltd., 2015.

**Web links and Video Lectures:**

**1. http://nptel.ac.in/courses.php?disciplineID=111**
**2. http://www.class-central.com/subject/math(MOOCs)**
**3. http://academicearth.org/**

**Course Outcomes:**

On completion of this course, students are able to:

| CO# | Course Outcomes |
|---|---|
| **CO1** | Evaluate various physical models through higher order differential equations and solve such linear ordinary differential equations. |
| **CO2** | Apply the applications of Power series and obtain series solution of ordinary differential equations. |
| **CO3** | To Create a variety of partial differential equations and solution by exact Methods / method of separation of variables. |
| **CO4** | Understanding the definition of Analytic function and role of Cauchy-Rieman equations in verifing the analyticity and construction of analytic function. |
| **CO5** | Make the use of the multivariate calculus to understand the solenoidal and irrotational vectors and solving the system of equations by various methods. |

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**COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):**

Note:1-Low, 2-Medium, 3-High

| CO/PO | PO.1 | PO.2 | PO.3 | PO.4 | PO.5 | PO.6 | PO.7 | PO.8 | PO.9 | PO.10 | PO.11 | PO.12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | | | | | | | | | | |
| CO2 | 3 | 1 | | | | | | | | | | |
| CO3 | 3 | 2 | | | | | | | | | | 1 |
| CO4 | 3 | 2 | | | | | | | | | | 1 |
| CO5 | 3 | 2 | | | | | | | | | | 1 |

**Question Paper Pattern:**

• The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
• The question paper will have ten full questions carrying equal marks.
• Each full question carries 20 marks.
• There will be two full questions (with a maximum of four sub questions) from each module.
• Each full question will have sub questions covering all the topics under a module.
• The students will have to answer five full questions, selecting one full question from each module.

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