

**PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018**  
**(AUTONOMOUS)**  
**B.E. CIVIL ENGINEERING**  
**REGULATIONS 2015**  
**CURRICULUM**

**SEMESTER I**

<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
MA 15101	Matrices and Calculus	3	2	0	4
EN 15101	Technical English I	3	0	0	3
PH 15101	Engineering Physics	3	0	0	3
CH 15101	Engineering Chemistry I	3	0	0	3
ME 15101	Engineering Graphics	3	2	0	4
EE 15102	Basic Electrical & Electronics Engineering	3	0	0	3
PC 15101	Physics & Chemistry Laboratory I	0	0	2	1
ME 15102	Computer Aided Drafting Laboratory	0	0	2	1
GE 15101	Engineering Practices Laboratory	0	0	4	2

**SEMESTER II**

<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
MA 15201	Differential Equations and Complex Analysis	3	2	0	4
EN 15201	Technical English II	3	0	0	3
PH 15202	Applied Physics	3	0	0	3
CH 15201	Engineering Chemistry II	3	0	0	3
CS 15201	Computer Programming	3	0	0	3
ME 15201	Engineering Mechanics	3	2	0	4
PC 15201	Physics & Chemistry Laboratory II	0	0	2	1
CS 15202	Computer Programming Laboratory	0	0	2	1
EN 15202	English Communication Skills Laboratory	0	0	2	1

**OBJECTIVES:**

To enable students to,

- find the Eigenvalues and Eigenvectors of a real matrix and discuss their properties, reduce a real symmetric matrix from quadratic form to canonical form.
- study the basic concepts of differentiation, curvature, calculate the radius of curvature and centre of curvature and find the evolute, involute and envelope of curves.
- explain functions of several variables, Taylor's series expansion, Jacobians and compute the maximum & minimum values.
- acquaint the student with the concepts of basic integration and integration by parts.
- explain the double & triple integrals, discuss the change of order of integration and use multiple integrals to find the area & volume.

**UNIT I MATRICES****9+6**

Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

**UNIT II DIFFERENTIAL CALCULUS****9+6**

Limit - Continuity, properties of limit and classification of discontinuities - Simple problems. Differentiation – Standard forms, Successive differentiation and Leibnitz theorem. Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes.

**UNIT III FUNCTIONS OF SEVERAL VARIABLES****9+6**

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Differentiation of implicit functions – Jacobians – Taylor's expansion – Maxima and Minima – Method of Lagrangian multipliers.

**UNIT IV INTEGRAL CALCULUS****9+6**

Indefinite and definite integrals – Standard form of integrals, properties of integrals, integration of simple function. Methods of integration – Decomposition method, substitution method, integration by parts – Reduction formulae involving exponential and trigonometric functions, Bernoulli's formula.

## UNIT V MULTIPLE INTEGRALS

9+6

Double integration – Cartesian and polar co-ordinates – Change of order of integration – Change of variables between Cartesian and polar co-ordinates – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral.

**TOTAL (45+30): 75 PERIODS**

### LEARNING OUTCOMES:

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

- identify algebraic Eigenvalue problems from practical areas and obtain the Eigen solutions in certain cases and to have acquired the technique of diagonalizing a matrix which would render the Eigen solution procedure very simple.
- understand effectively the geometrical aspects of curvature, involutes and evolutes of plane curves, essential concepts for an engineer, as elegant applications of differential calculus.
- understand and handle functions of more than one variable, from the points of view of their differentiation, expansions and extreme values, along with differentiation under integral sign which are encountered in engineering studies.
- understand the methods of single, double and triple integration, which are needed in their studies in other areas and gained confidence to handle integrals of higher orders.

### TEXT BOOK:

1. Grewal. B.S, “Higher Engineering Mathematics”, 41<sup>st</sup> Edition, Khanna Publications, Delhi,(2011).
2. JayakumarP., Kishokkumar B and VimalaM., “Mathematics -I”, Global Publishers, Chennai, (2014).

### REFERENCES:

1. T. Veerarajan., “Engineering Mathematics”, 3<sup>rd</sup> Edition, Tata McGraw Hill, (2011).
2. Erwin Kreyszig., “Advanced Engineering Mathematics” 10<sup>th</sup> Edition, Wiley Publications.
3. Dass, H.K., and Er. RajnishVerma,” Higher Engineering Mathematics”, S. Chand Private Ltd.,(2011).
4. Glyn James, “Advanced Modern Engineering Mathematics”, 3<sup>rd</sup> Edition, Pearson Education,(2012).
5. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2008).

### WEB LINKS:

1. <http://www.sosmath.com/matrix/matrix.html>
2. <http://tutorial.math.lamar.edu/Classes/CalcI/CalcI.aspx>
3. <http://nptel.ac.in/courses/122104017/28>



Self introduction - personal information Name, background, study details, areas of interest, hobbies, strengths and weaknesses, role model and future ambition –Role Plays- Presentations on a given topic – participating in GDs- fundamentals.

### **COURSE OUTCOMES :**

- Use suitable vocabulary with confidence and express their ideas both in speech and writing.
- Listen and comprehend classroom lectures, short talks, conversations.
- Read, interpret and analyze a given text
- Effectively use cohesive devices in spoken and written English.

### **TEXT BOOK:**

1. Elango.K, & Co., “Resonance” Cambridge University Press India Pvt.Ltd. New Delhi, 2013.

### **REFERENCE BOOKS:**

1. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice. Oxford University Press, New Delhi. 2011.
2. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005
3. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi 2001.
4. Viswamohan, Aysha. English for Technical Communication. Tata McGraw -Hill, New Delhi.2008.
5. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011.

### **WEB SOURCE:**

- <http://writing-program.uchicago.edu/resources/grammar.htm>
- <http://www.grammarbook.com/>
- [www.onestopenenglish.com](http://www.onestopenenglish.com)
- [www.englishforeveryone.com](http://www.englishforeveryone.com)
- [www.learnenglish.com](http://www.learnenglish.com)

**COURSE OBJECTIVES**

- To understand the basic concepts in properties of matter.
- To recognize the knowledge in the areas of acoustics, ultrasonics and applications.
- To describe the dual nature of matter, x-ray scattering and applications of Schrodinger wave equation.
- To categorize the basics knowledge in interference, laser and fibre optics.
- To identify the different crystal structures and crystal growth techniques.

**UNIT I      PROPERTIES OF MATTER****9**

Introduction- Elasticity–Hooke’s law – relationship between three moduli of elasticity (qualitative) – stress –strain diagram – Poisson’s ratio –factors affecting elasticity. Bending moment – Young’s modulus: theory and experiment (uniform and non-uniform bending) – I-shaped girders – twisting couple of a wire or cylinder -torsion pendulum –determination of rigidity modulus.

**UNIT II      ACOUSTICS AND ULTRASONICS****9****Acoustics:**

Introduction- classification of sound –characteristics of musical sound– decibel –Weber- Fechner law - absorption co-efficient– reverberation – reverberation time – Sabine’s formula: growth and decay of sound energy– factors affecting acoustics of buildings and their remedies.

**Ultrasonics:**

Introduction-properties-production: magnetostriction and piezoelectric methods–detection of ultrasonic waves Kundt’s tube–determination of velocity of sound in liquid (acoustic grating). Application: SONAR. Non destructive testing – pulse echo system through transmission and reflection modes.

**UNIT III      MODERN PHYSICS****9**

Black body radiation – Planck’s theory (derivation) – deduction of Wien’s displacement law and Rayleigh Jean’s law. X-ray scattering: Compton effect –derivation –experimental verification. Matter waves–de Broglie wavelength– Schrodinger’s time independent and time dependent equations -physical significance of the wave function. Applications: particle in one dimensional box-degenerate and non-degenerate states.

**UNIT IV      APPLIED OPTICS****9**

**Interference:** Michelson interferometer: construction and working. Applications: determination of wave length and thickness. Air wedge –theory and determination of thickness of a thin wire.

**Laser:** properties–pumping methods -Einstein coefficients.Types:CO<sub>2</sub>, Nd-YAG and semiconductor lasers (hetero junction) –uses.

**Optical fiber:** Principle and propagation of light through optical fiber– expressions for numerical aperture and acceptance angle–types of optical fibers– fiber optical communication system (block diagram) – endoscope – Fiber optic sensors: temperature and displacement sensors.

## **UNIT V      CRYSTAL PHYSICS**

**9**

Lattice – unit cell – Bravais lattices – lattice planes – Miller indices –derivation for inter-planar spacing in terms of Miller indices– calculation of number of atoms per unit cell , atomic radius , coordination number and packing factor for SC, BCC, FCC and HCP structures.

X-ray diffraction: Bragg’s law –diffraction methods – powder and Laue methods. Growth Techniques: Bridgman and Czochralski techniques.

**TOTAL:                      45**

## **PERIODS**

## **COURSE OUTCOMES**

Upon the completion of the course, students will be able to

- assess the elastic properties of the materials.
- relate the fundamental knowledge of acoustics which would facilitate in acoustical design of buildings and ultrasonics.
- know the development of modern physics and its applications.
- recognize the uses of laser and the propagation of light through fiber optics.
- distinguish the different crystal systems, structural determination and synthesis of crystals.

## **TEXT BOOKS**

1. A.Marikani, Engineering Physics, PHI, New Delhi, 2013.
2. S.Vadivel&A.Pannerselvam, Engineering Physics, Jaitech Publications, 2015 (Revised edition).

## **REFERENCES:**

1. S.Selladurai, Engineering Physics Part-I, PHI learning private limited, New Delhi, 2010.
2. R.K. Gaur, S.L. Gupta, Engineering Physics, DhanpatRai publications, 2013
3. V.Rajendran, "Engineering Physics", Tata McGraw-Hill. New Delhi.2011
4. P.K.Palanisamy Engineering Physics. SCITECH Publications, 2011
5. A.S. Vasudeva, Modern Engineering Physics, Pub. S. Chand, New Delhi, 2013.

**WEB LINKS:**

1. <http://science.howstuffworks.com/laser1.html>
2. <http://www.npatel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/engg.physics/index-cont.html>
3. <http://de.physnet.net/PhysNet/education.html>



(Common to all branches)

## COURSE OBJECTIVES

- To know the need of polymers for industrial application.
- To understand the interrelation of heat and work within the confines of the laws of thermodynamics.
- To understand the basic concepts of instrumentation, data acquisition, data processing and the principles of analytical techniques and their applications.
- To predict the number of stable phases that may exist in equilibrium for a particular system.
- To acquaint the students with the basics of Nano materials, their properties and applications.

### UNIT I POLYMERS 9

Introduction: Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization: Addition (Free Radical, cationic and anionic); condensation and copolymerization. Effect of polymer structure and properties of polymers strength, plastic deformation, physical state and chemical resistance. Preparation, properties and uses of Nylon 6, Teflon, epoxy resin and polycarbonate (Lexan).

### UNIT II CHEMICAL THERMODYNAMICS 9

Terminology of thermodynamics- Second law: Entropy- Entropy change for an ideal gas, reversible and irreversible process; Entropy of Phase transition: Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions(problems); Criteria of spontaneity: Gibbs Helmholtz Equation(problems); ClausiusClapeyron equation ; Maxwell Relations- Vant Hoff Isotherm and Isochore (problems).

### UNIT III ANALYTICAL TECHNIQUES 9

Spectroscopy -Types- Electromagnetic spectrum – Absorption of radiation – Beer-Lambert's law – UV-Visible spectroscopy and IR spectroscopy – principles and instrumentation (block diagram only Electronic, Vibrational and rotational transitions. UV- visible and IR spectroscopy- principles, instrumentation (block diagram only). Estimation of iron by colorimetry – flame photometry principles and instrumentation (block diagram only) - estimation of sodium by flame photometry – Atomic absorption spectrophotometer (AAS) - principles and instrumentation (block diagram only) – estimation of nickel by AAS.

### UNIT IV PHASE RULE AND ALLOYS 9

Phase rule: Introduction, and explanation of terms with examples, One Component System: Water System- Reduced phase rule- Two Component Systems- Classification- Lead- Silver system, Zinc – Magnesium system. Alloys: Introduction – Definition – properties of Alloys- significance of alloying. Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless Steel- Heat treatment of steel: Non Ferrous alloys; Brass and Bronze.

## **UNIT V        NANOCHEMISTRY**

**9**

Basics-distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoparticles: nano cluster, nano rod, nanotube(CNT) and nanowire. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrode position, chemical vapour deposition, laser ablation; Properties and applications.

**TOTAL : 45 PERIODS**

### **COURSE OUTCOMES**

- To select a polymeric material for a specific engineering application.
- To know the basic concepts of internal energy, enthalpy, entropy, free energy and chemical potential.
- To gain practical experience with chemical process equipment as well as to analyze and interpret data.
- To classify the states in a equilibrium in a heterogeneous system. To become familiar with the types, the heat treatment and properties of alloys .
- To identify the particle size, and the application of Nanomaterials in various fields .

### **TEXT BOOKS**

1. P.C.Jain and Monica Jain, “Engineering Chemistry”, 15th ed., DhanpatRaiPub.Co, New Delhi, (2012).
2. S.S.Dara, “A Text book of Engineering Chemistry”, S.Chand&Co.Ltd ., New Delhi, (2009).

### **REFERENCE BOOKS**

1. B. Sivasankar, “Engineering Chemistry”, Tata McGraw-Hill Pub. Co. Ltd., New Delhi (2008).
2. R.Sivakumar and N.Sivakuamr, “Engineering Chemistry”, Tata McGraw-Hill publishing company limited, New Delhi, (2009)

3. B.K. Sharma, "Engineering Chemistry", Krishna Prakasam Media (P) Ltd., Meerut (2001).
4. Bahl B.S., Tuli G.D. and Arun Bahl., Essential of Physical Chemistry, S.Chand & Co. Ltd., New Delhi. (2010).
5. Geoffrey A ozin, Andre Arsonault and Ludovicacademariti. "A chemical approach to nanomaterials", Chemistry for Royal society Revised edition London, (2009).

**WEB LINKS:**

1. [www.wij.iq.com](http://www.wij.iq.com)
2. [www.nptel.ac.in](http://www.nptel.ac.in)
3. [www.faadooengineers.com](http://www.faadooengineers.com)

**COURSE OBJECTIVES**

- To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
- To impart knowledge on projection of points, lines and plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces
- To make the students understand the viewing perception of a solid object in Isometric and Perspective projections

**Concepts and Conventions (Not for Examination)****2**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

**UNIT I PLANE CURVES AND FREE HAND SKETCHING****8+6****Curves used in engineering practices:**

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid, Epicycloid and Hypocycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Construction of Spiral curve.

**Free hand sketching:**

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

**UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES****8+6**

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes -Determination of true

lengths and true inclinations by rotating line method and traces. Projection of planes inclined to both the principal planes by rotating object method.

**UNIT III      PROJECTION OF SOLIDS      6+6**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

**UNIT IV      PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES      8+6**

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

**UNIT V      ISOMETRIC AND PERSPECTIVE PROJECTIONS      8+6**

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

**INTRODUCTION TO INTERSECTION OF SOLIDS (Not for Examination)      5**

Introduction to intersection of surfaces – Line of intersection – Intersection of solids

**TOTAL (45+30): 75 PERIODS**

**COURSE OUTCOMES**

On Completion of the course the student will be able to

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Draw the projections of points, straight lines and plane surfaces in given quadrant
- Understand the projection of solids in various positions in first quadrant
- Draw projections and solids and development of surfaces.

- Prepare isometric and perspective sections of simple solids.

## **TEXT BOOK**

1. Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.
2. Prabhakaran.S, Makesh.M, Subburam.V, “Engineering Graphics”, Sams Publishers, Chennai, 2014.

## **REFERENCES**

1. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
2. Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.
4. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.
5. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

## **WEBLINK**

- <http://www.nptel.ac.in/courses/112103019>
- <http://www.engineeringdrawing.org/>
- <http://www.mechanical.in/engineering-graphics/>

Publication of Bureau of Indian Standards:

- IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
- IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
- IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
- IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
- IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.



## **UNIT V      ELECTRICAL SAFETY PRACTICES & STANDARDS**

**6**

Indian electricity act and rules- general safety requirements as per IE rules- electrical safety equipment's- electrical installation: ground clearance, section clearance, – earthing, specifications, earth resistance, earth pit maintenance. Case study.

**TOTAL: 45 PERIODS**

### **COURSE OUTCOMES**

At the end of course, the student will able to

- get the basic knowledge about the AC &DC electric circuits.
- understand the principles of electrical wiring and methods.
- acquire the knowledge of Electrical Safety Standards.

### **TEXT BOOKS**

1. S.K.Bhattacharya, Basic Electrical and Electronics Engineering, Pearson Education India(2011).
2. John Cadick, Electrical Safety Handbook, 4<sup>th</sup> edition, Mcgraw-hill (2012).

### **REFERENCES**

1. Nagsarkar T K and Sukhija M S, Basics of Electrical Engineering, Oxford press (2005).
2. Indian Electricity Act and Rules, Government of India.
3. Mehta V K, "Principles of Electronics", S.Chand& Company Ltd, 3<sup>rd</sup> Edition.
4. J.B. Gupta, A Textbook of Basic Electrical and Electronics Engineering, S.K. Kataria& Sons; Reprint 2013 edition (2013).

### **WEB LINKS**

- [www.rejinpaul.com/.../ge6251-basic-electrical-and-electronics-engineeri...](http://www.rejinpaul.com/.../ge6251-basic-electrical-and-electronics-engineeri...)
- [www.faadooengineers.com/.../448-BASIC-ELECTRICAL-ENGINEERIN...](http://www.faadooengineers.com/.../448-BASIC-ELECTRICAL-ENGINEERIN...)
- [zebu.uoregon.edu/~rayfrey/432/DigitalNotes.pdf](http://zebu.uoregon.edu/~rayfrey/432/DigitalNotes.pdf)



**PHYSICS LABORATORY- I****COURSE OBJECTIVES**

To compile various experiments to enhance the basic understanding and concepts of physics in properties of matter, sound, light, thermal physics and electricity.

**LIST OF EXPERIMENTS**

1. a) Determination of wavelength and particle size using Laser.  
b) Determination of acceptance angle in an optical fiber.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
3. Determination of wavelength of mercury spectrum – spectrometer grating.
4. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
5. Determination of Young's modulus by non- uniform bending method.

**COURSE OUTCOMES**

Upon the completion of the course, students will be able to apply Physics principles to evaluate mechanical, electrical, thermal and optical characteristics of materials.

**CHEMISTRY LABORATORY-I****COURSE OBJECTIVES.**

- To analyze the hardness of water, impurities in water, water quality parameters and nature of chemicals in neutral medium.

**LIST OF EXPERIMENTS**

1. Determination of DO content of water sample by winkler's method.
2. Determination of chloride content of water sample by Argentometric method.
3. Determination of strength of given hydrochloric acid using pH meter.
4. Determination of strength of acids in a mixture using conductivity meter.
5. Conductometric titration of strong acid Vs Strong base.

**TOTAL : 30 PERIODS**

## **COURSE OUT COMES**

- At the end of the course the student will be able to know the quality of water and chemical process taking place in different medium.

**COURSE OBJECTIVES**

This program prepares students for careers in the Mechanical, Civil or Architectural drafting fields. Students will utilize the latest CAD systems to design and develop their assignments..

**List of Exercises using software capable of Drafting**

1. Study of capabilities of software for Drafting and Modeling - Coordinate systems (absolute, relative, polar, etc.) - Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, ellipse, hyperbola, spiral, involute using B-Spline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixer, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building ( Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3D model.
11. Development of prism, pyramid, cylinder, cone, etc, in 2-Dimensional

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

**TOTAL: 30 PERIODS**

**OUTCOMES**

1. Develop competency in basic drafting, enabling them to pursue careers in engineering, professional arenas, or to further their academic pursuits.
2. Have practical experience in Computer Aided Drafting and Design.

3. Demonstrate an understanding of Engineering and Mechanical Cad Drafting and 3D Design

**GE 15101**

**ENGINEERING PRACTICES LABORATORY**

**0 0 4 2**

## **COURSE OBJECTIVES**

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

### **GROUP A (CIVIL & MECHANICAL)**

#### **I CIVIL ENGINEERING PRACTICE**

##### **Buildings:**

- (a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

##### **Plumbing Works:**

- (b) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
- (c) Study of pipe connections requirements for pumps and turbines.
- (d) Preparation of plumbing line sketches for water supply and sewage works.
- (e) Hands-on-exercise:  
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
- (f) Demonstration of plumbing requirements of high-rise buildings.

##### **Demonstration on Carpentry using Power Tools only:**

- (a) Study of the joints in roofs, doors, windows and furniture.
- (b) Hands-on-exercise:  
Wood work, joints by sawing, planing and cutting.

## **II MECHANICAL ENGINEERING PRACTICE**

### **Welding:**

- Preparation of arc welding of butt joints, lap joints and tee joints.
- Gas welding practice

### **Basic Machining:**

- Simple Turning and Taper turning
- Drilling Practice
- Sheet Metal Work:
- Model making – Trays, funnels, etc.
- Different type of joints.

### **Fitting:**

- Square fitting
- Vee – fitting models

### **Demonstration on:**

- a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
- b) Foundry operations like mould preparation for gear and step cone pulley.

## **GROUP B (ELECTRICAL & ELECTRONICS)**

### **III ELECTRICAL ENGINEERING PRACTICE**

1. Study of electrical tools and safety measures
2. Basic wiring practices - Stair-case wiring, Fluorescent lamp wiring and Residential house wiring
3. Measurement of electrical parameters such as voltage, current, power & power factor in RLC circuit.
4. Measurement of energy using single phase energy meter.
5. Earthing Practices & Measurement of earth resistance using megger.
6. Study of electrical equipments such as iron box, induction heater.

### **IV ELECTRONICS ENGINEERING PRACTICE**

1. Study of Electronic components and equipments – Resistor, color coding measurement of AC signal parameter (Peak-Peak, RMS, Period, and Frequency) using CRO.
2. Study of logic gates AND, OR, Ex-OR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR.
6. Construction and verification of half adder circuit.
7. Construction and verification of half subtractor circuit.
8. Study of Telephone, F.M Radio and Cell Phone.

**TOTAL : 60 PERIODS**

### **COURSE OUTCOMES:**

#### **At the end of the course, the student will be able to**

- Use tools and equipment for fitting, carpentry, sheet metal, welding, electrical wiring and plumbing
- Prepare the models by fitting operation & carpentry operation.
- Construct electrical wiring circuit and demonstrate practically.

**SEMESTER II**

**(Common to all Branches)**

**OBJECTIVES:**

To discuss a wide range of basic mathematical methods for solving different types of problems arising in the fields of Science, Mathematics and Engineering

- to make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- to acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- to develop an understanding of the standard techniques of complex variable theory so as
- to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
- to make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

**UNIT I ORDINARY DIFFERENTIAL EQUATIONS****9+6**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

**UNIT II VECTOR CALCULUS****9+6**

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stokes’ theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

**UNIT III ANALYTIC FUNCTIONS****9+6**

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping :  $w= z+c$ ,  $cz$ ,  $1/z$ , and bilinear transformation.

**UNIT IV COMPLEX INTEGRATION****9+6**



Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula – Taylor and Laurent expansions – Singular points – Residues – Residue theorem – Application of residue theorem to evaluate real integrals – Unit circle and semicircular contour (excluding poles on boundaries).

#### **UNIT V LAPLACE TRANSFORM**

**9+6**

Laplace transform – Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions. Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

**TOTAL (45+30): 75**

#### **PERIODS**

#### **LEARNING OUTCOMES:**

On completion of the course the students will be able to

- have learnt the method of solving differential equations of certain types, including systems of differential equations that they might encounter in their studies of other subjects in the same or higher semesters.
- have studied the basics of vector calculus comprising of gradient, divergence and curl, and line, surface and volume integrals and the classical theorems involving them, which would be encountered by them in their engineering subjects in the same or higher semesters.
- have a good grasp of analytic functions and their interesting properties which could be exploited in a few engineering areas and be introduced to the host of conformal mappings with a few standard examples that have direct application.
- have grasped the basis of complex integration and the concept of contour integration which is an important tool for evaluation of certain integrals encountered in practice.
- have a sound knowledge of Laplace transform and its properties and sufficient exposure to solution of certain linear differential equations using the Laplace transform technique which have applications in other subjects of the current and higher semesters.

#### **TEXT BOOKS:**

1. Grewal. B.S, “Higher Engineering Mathematics”, 41<sup>st</sup> Edition, Khanna Publications, Delhi,(2011).

2. JayakumarP., Kishokkumar B and VimalaM., “Mathematics -I”, Global Publishers, Chennai.,(2014).

**REFERENCES:**

1. Erwin Kreyszig, “Advanced Engineering Mathematics” 10<sup>th</sup> Edition, Wiley Publications (2010).
2. Dass, H.K., and Er. RajnishVerma, “Higher Engineering Mathematics”, S. Chand Private Ltd.,(2011).
3. T. Veerarajan., “Engineering Mathematics”, 3<sup>rd</sup> Edition, Tata McGraw Hill, 2011.
4. Peter V. O’Neil, “Advanced Engineering Mathematics”, 7<sup>th</sup> Edition, Cengage learning, (2012).
5. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2008).

**WEB LINKS:**

1. <http://tutorial.math.lamar.edu/Classes/DE/DE.aspx>
2. <https://rutherglen.science.mq.edu.au/wchen/lnicafolder/lnica.html>
3. <http://www.nptel.ac.in/courses/111103070/>



## **OUTCOMES :**

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

- Speak with clarity and confidence
- Write comprehensive and grammatically correct reports, job applications and draft effective e-mails.
- Make effective presentations using power point.
- Participate successfully in Group Discussions.

## **TEXT BOOK:**

1. Elango.K, & Co., “Resonance” Cambridge University Press India Pvt.Ltd. New Delhi, 2013.

## **REFERENCE BOOKS:**

1. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice. Oxford University Press, New Delhi. 2011.
2. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005
3. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi, 2001.
4. Viswamohan, Aysha. English for Technical Communication. Tata McGraw -Hill, New Delhi, 2008.
5. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai, 2011.

## **WEB LINKS:**

1. <http://writing-program.uchicago.edu/resources/grammar.htm>
2. <http://www.grammarbook.com/>
3. <http://www.myenglishteacher.eu/blog/english-grammar/>
4. www. Ted Talks.com
5. [www.documentariesheaven.com](http://www.documentariesheaven.com)

**COURSE OBJECTIVES**

- To develop knowledge about the conduction properties of metals.
- To correlate better understanding on carrier concentration and its variation with temperature in different types of semiconductors.
- To compute the different kinds of polarization mechanisms and applications of dielectric materials.
- To recognize the different types of magnetic materials and its uses.
- To describe the various material characterization techniques.

**UNIT I CONDUCTING MATERIALS****9**

Introduction: types of conducting materials- classical free electron theory: postulates- derivation of electrical conductivity. Thermal conductivity- derivation. Wiedemann-Franz law and its verifications- Lorentz number—merits and demerits of classical free electron theory. Quantum free electron theory: Fermi-Dirac distribution function and its variation with temperature – density of energy states –carrier concentration in metals- average energy of electrons at 0K.

**UNIT II SEMICONDUCTING MATERIALS****9**

Introduction: direct and indirect band gap semiconductors- origin of band gap in solids (qualitative treatment only) - concept of effective mass of an electron and hole. Intrinsic semiconductor: expressions for density of electrons, holes, carrier concentration, Fermi level, electrical conductivity and band gap.

Extrinsic semiconductors: derivations for charge carrier in n-type and p-type semiconductors – variation of Fermi level with temperature and impurity concentration. Hall effect—theory and experimental determination of Hall coefficient – Applications.

**UNIT III DIELECTRIC MATERIALS****9**

Introduction: fundamental definitions in dielectrics—expressions for electronic and ionic polarization mechanisms- orientation polarization (qualitative) – space charge polarization – Langevin – Debye equation – frequency and temperature effects on polarization. Internal field – expression for internal field (cubic structure) –Clausius–Mosotti equation—significance—dielectric loss –dielectric breakdown – various breakdown mechanisms with characteristics – applications of dielectric materials.

## **UNIT IV      MAGNETIC MATERIALS**

**9**

Introduction: basic definitions - origin of magnetic moment-Bohr magneton- magnetic materials: classification of dia, para, ferro magnetic materials. Ferro magnetic domains- energies involved in the growth of magnetic domains- hysteresis-explanation of hysteresis curve based on domain theory- soft and hard magnetic materials-ferrites - applications.Magneto resistance (MR) and giant magneto resistance (GMR).

## **UNIT V      MATERIALS CHARACTERIZATION**

**9**

Introduction: Thermogravimetric analysis (TGA) – differential thermal analysis (DTA) – differential scanning calorimetry (DSC) – electron microscopy, scanning electron microscope (SEM) – transmission electron microscope (TEM) – atomic force microscope (AFM)–scanning tunneling microscope (STM) – electrostatic force mode (EFM) – magnetic force mode (MFM).

**TOTAL: 45 PERIODS**

### **COURSE OUTCOMES**

Upon completion of the course, the students will be able to

- select the metals required for specific applications in the area of engineering and technologies.
- distinguish between different types of semiconductor and determinations of Hall co-efficient.
- classify different kinds of polarization mechanism and uses.
- identify different magnetic materials and giant magneto resistance.
- relate the different types of characterization techniques.

### **TEXT BOOKS**

1. V.Rajendran, “Materials Science”, Tata McGraw- Hill, New Delhi, 2011.
2. S.Vadivel, A.Pannerselvam, Solid State Physics, Jaitech Publications, 2015 (Revised edition).

### **REFERENCES**

1. Charles Kittel, “Introduction to Solid State Physics”, John Wiley & sons, 7<sup>th</sup> edition, Singapore (2007).
2. P.K.Palanisamy, Materials Science. SCITECH Publishers, 2011.
3. S.O.Pillai, Solid State Physics. New Age International(P) Ltd., publishers, 2009
4. T.Pradeep, “A Text Book of Nanoscience and Nanotechnology”, Tata McGraw Hill,

New Delhi, 2012.

5. Sam Zhang, "Materials Characterization Techniques", CRC Press, 2008.

#### **WEB LINK**

1. <http://www.npatel.iitm.ac.in/courses/Webcourseontents/IIT%20Guwahati/engg.physics/indexcont.html>.
2. <http://www.careercornerstone.org/matscieng/matsciengfield.htm>
3. <http://hyperphysics.phy-astr.gsu.edu/hbase/solids/intrin.html#c1>

**COURSE OBJECTIVES**

The students are able to

- study about the principles of electrochemistry.
- know the mechanism of corrosion and its control.
- learn the principles and generation of fuel cells and various storage batteries.
- embellish the usage of chemistry to exhibit engineering materials.
- study about the principles of chem -informatics and its applications.

**UNIT I ELECTROCHEMISTRY****9**

Electrochemical cells-types- reversible and irreversible cells – EMF –measurement of emf-Single electrode potential – Nernst Equation (derivation and problem) – reference electrodes – standard hydrogen electrode - calomel electrode – Ion selective electrode – glass electrode – measurement of pH – electrochemical series – significance -potentiometric titrations (redox –  $\text{Fe}^{2+}$  Vs dichromate).

**UNIT II CORROSION AND CORROSION CONTROL****9**

Corrosion-Causes-Types-Chemical corrosion - Pilling-Bedworth rule – electrochemical corrosion – mechanism - galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – preliminary treatment – Paints – constituents and function - electroplating (Au) – electroless plating (Ni).

**UNIT III NONCONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES****9**

Nuclear energy-fission and fusion reaction and light water nuclear reactor for power generation (block diagram only)-breeder reactor-solar energy conversion-solar cells-wind energy-Fuels cells-hydrogen-oxygen fuel cell-batteries-alkaline batteries-lead acid-nickel cadmium, lithium batteries and Nano batteries.

**UNIT IV ENGINEERING MATERIALS****9**

Refractories – classification – acidic, basic and neutral refractories – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) – manufacture of alumina, magnesite and zirconia bricks. Lubricants – mechanism of lubrication, liquid lubricants, - properties – viscosity index, flash and fire points, cloud and pour points, oiliness) – solid lubricants – graphite and



molybdenum sulphide. Nanomaterials – introduction to nanochemistry – carbon nanotubes and their applications.

## **UNIT V CHEMINFORMATICS**

**9**

Definition – coordinate –bonds –bond length – bond angles – torsional angles – chemical structure – definition - conformation – representation of structural information – linear format – SMILEYF notation – MOL format – PDB format – storage of structural data in a database - structural keys – finger print - canonical structure – similarity search –sub structure search - application of chem-informatics in drugs designing.

**TOTAL : 45 PERIODS**

### **COURSE OUTCOMES**

- Understand the impact of engineering solutions in a global, economic, environmental and societal context .
- Knowing the rate of corrosion of a given metal in a given environment and identify appropriate control techniques to avoid corrosion.
- To recognize the energy densities of energy sources.
- Understand the Engineering materials and use these materials in various fields. Identify appropriate lubricant for different engineering applications.
- Understand the basics concept of dry designing by chem-informatics.

### **TEXT BOOKS**

1. B. Sivasankar, “Engineering Chemistry”, Tata McGraw-Hill Pub. Co. Ltd., New Delhi (2008).
2. B.K. Sharma, “Engineering Chemistry”, Krishna Prakasam Media (P) Ltd., Meerut (2001).

### **REFERENCE BOOKS**

1. P.C. Jain and Monica Jain, “Engineering Chemistry” DhanpatRai Pub. Co., New Delhi, 15<sup>th</sup> Edition, 2008(Revised Edition 2012).
2. Bahl B.S.,Tuli G.D. and ArunBahl., Essential of Physical Chemistry, S.Chand& Co. Ltd., New Delhi (2010).
3. Puri B.R., Sharma L.R. and Pathania M.S., Principles of Physical chemistry, ShobanLalNagin Chand & Co., New Delhi (2008) .
4. R.Sivakumar and N.Sivakuamr, “Engineering Chemistry”, Tata McGraw-Hill publishing company limited, New Delhi, (2012).

5. RajarshiGuha and Andreas Bender “Computational approaches in chem-informatics and bioinformatics” Wiley Publishers, Cambridge (2011).

**WEB LINKS :**

1. [www.worldcat.org](http://www.worldcat.org)
2. [www.book.boon.com](http://www.book.boon.com)
3. [www.chemwiki.ucdavis.edu](http://www.chemwiki.ucdavis.edu)

**COURSE OBJECTIVES**

The students should be made to:

- Learn the fundamentals of programming
- Be exposed to the syntax and semantics for C language.
- Develop C code for simple logic.
- Know the use of Functions and Pointers
- Understand the constructs of structured programming including Structure, Union and File handling functions.

**UNIT I INTRODUCTION TO COMPUTERS 9**

Introduction – Characteristics of Computers – Evolution of Computers – Computer Generations – Classification of Computers – Basic Computer organization – Number Systems. Computer Software –Types of Software – Software Development Steps – Internet Evolution - Basic Internet Terminology – Getting connected to Internet Applications. Problem Solving Techniques- Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudo code. Application Software Packages- Introduction to Office Packages -CorelDraw – SGML – Illustrator(not detailed commands for examination).

**UNIT II BASICS OF ‘C’ LANGUAGE 9**

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making - Branching and Looping.

**UNIT III ARRAYS AND STRINGS 9**

Array Concepts- Two Dimensional Array - Passing Arrays to Functions - Multi Dimensional Array. String Operations - Sorting and Searching

**UNIT IV FUNCTIONS AND POINTERS 9**

Functions – Function Prototypes – Parameter Passing Methods – Recursion – Library Functions. Pointers – Pointers and Functions – Pointers and Strings – Operations on Pointers – Dynamic Memory Allocation

**UNIT V STRUCTURE, UNIONS AND FILE HANDLING 9**

Structures and Union – Declaring , Accessing, Initialization, Structure assignment, Nested Structure, Array of Structure. File Handling Functions.

**TOTAL:45 PERIODS**

**COURSE OUTCOMES**

- At the end of the course, the student should be able to:
- Understand the basic terminologies used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Understand the dynamics of memory by the use of pointers.

**TEXT BOOKS:**

1. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009.

**REFERENCES:**

1. Byron Gottfried, “Programming with C”, 3rd Edition, (Indian Adapted Edition), TMH publications, 2010.
2. Stephen G.Kochan, “Programming in C”, 5th Edition, Pearson Education India, (2011).
3. Brian W.Kernighan and Dennis M.Ritchie, “The C Programming Language”, Pearson Education Inc., (2009).
4. E.Balagurusamy, “Computing fundamentals and C Programming”, TataMcGraw-Hill Publishing Company Limited, (2011).
5. Dromey R.G., “How to Solve it by Computer”, Pearson Education, Fifth Reprint, 2009.

**WEB LINKS:**

1. <http://www.nptel.ac.in/>
2. [http://www.tutorialspoint.com/cprogramming/cprogramming\\_tutorial.pdf](http://www.tutorialspoint.com/cprogramming/cprogramming_tutorial.pdf)
3. <https://www.youtube.com/watch?v=QsBVjhRlfh8>

**COURSE OBJECTIVES**

- To develop the ability to solve engineering problems dealing with force, displacement, velocity and acceleration by understanding the basic concepts.
- To gain knowledge on concepts involved in equilibrium of rigid bodies.
- To impart analytical ability to solve problems involving moments of surfaces and solids
- To develop knowledge to analyse the forces acting in the dynamics of particles
- To solve rigid body problems subjected to friction and elements of rigid bodies.

**UNIT I BASICS & STATICS OF PARTICLES****9+3**

Introduction - Units and Dimensions - Laws of Mechanics - Lame's theorem, Parallelogram and triangular Law of forces - Vectors - Vectorial representation of forces and moments - Vector operations: additions, subtraction, dot product, cross product - Coplanar Forces - Resolution and Composition of forces - Equilibrium of a particle - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces - Principle of transmissibility.

**UNIT II EQUILIBRIUM OF RIGID BODIES****9+3**

Free body diagram - Types of supports and their reactions - requirements of stable equilibrium Moments and Couples - Moment of a force about a point and about an axis - Vectorial representation of moments and couples - Scalar components of a moment - Varignon's theorem - Equilibrium of Rigid bodies in two dimensions - Equilibrium of Rigid bodies in three dimensions – Examples

**UNIT III PROPERTIES OF SURFACES AND SOLIDS****9+3**

Determination of Areas and Volumes - First moment of area and the Centroid of sections - Rectangle, circle, triangle from integration - T section, I section, - Angle section, Hollow section by using standard formula - second and product moments of plane area - Rectangle, triangle, circle from integration - T section, I section, Angle section, Hollow section by using standard formula - Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia

**UNIT IV DYNAMICS OF PARTICLES****9+3**

Displacements, Velocity and acceleration, their relationship - Relative motion - Curvilinear motion - Newton's law - Work Energy Equation of particles - Impulse and Momentum - Impact of elastic bodies.

**UNIT V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS****9+3**

Frictional force - Laws of Coloumb friction - simple contact friction - Rolling resistance - Belt friction. Translation and Rotation of Rigid Bodies - Velocity and acceleration - General Plane motion.

**TOTAL(45+15): 60 PERIODS****COURSE OUTCOMES**

- Ability to explain the differential principles applied to solve engineering problems dealing with force, displacement, velocity and acceleration.
- Gain indepth knowledge about equilibrium of rigid bodies.
- Identify and calculate the various properties of surfaces and solids
- Ability to analyse the forces in any structures.
- Ability to solve rigid body problems subjected to dynamic forces.

**TEXT BOOK**

1. Dr.N.Kottiswaran., "Engineering Mechanics"10th Edition, Sri Balaji Publications 2010.
2. Palanichamy, M.S., Nagam, S., "Engineering Mechanics - Statics & Dynamics", Tata McGraw-Hill, (2001).

**REFERENCES**

1. Beer, F.P and Johnson Jr. E.R. "Vector Mechanics for Engineers", Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, (1997).
2. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd.,

3. Irving H. Shames and Krishna Mohana Rao. G., “Engineering Mechanics – Statics and Dynamics”, 4th Edition, Pearson Education 2006.
4. Meriam J.L. and Kraige L.G., “ Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2”, Third Edition, John Wiley & Sons,1993.
5. Rajasekaran, S, Sankarasubramanian, G., "Fundamentals of Engineering Mechanics”, Vikas Publishing House Pvt. Ltd., (2000).

#### **WEBLINK**

- <http://www.nptel.ac.in/courses/112103109/>
- <https://www.coursera.org/learn/engineering-mechanics-statics/home/info>
- <http://www.myopencourses.com/subject/engineering-mechanics-2>

**PHYSICS LABORATORY- II****COURSE OBJECTIVES**

- To assess various experiments to enhance the basic understanding and concepts of Physics in properties of matter, optics and semiconductor.

**LIST OF EXPERIMENTS**

1. Determination of Young's modulus by uniform bending method.
2. Determination of band gap of a semiconductor.
3. Determination of coefficient of viscosity of a liquid –Poiseuille's method.
4. Determination of thickness of a thin wire – Air wedge method.
5. Determination of rigidity modulus – Torsion pendulum.

**COURSE OUTCOMES**

Upon the completion of the course, students will be able to apply Physics principles to perceive mechanical, electrical, and optical characteristics of materials.

**CHEMISTRY LABORATORY-II****COURSE OBJECTIVES**

- To develop the practical knowledge through the instrumental methods of chemical analysis, role of chemistry in engineering applications and environmental impact of water..

**LIST OF EXPERIMENTS**

1. Determination of alkalinity in water sample.
2. Determination of total, temporary, and permanent hardness of water by EDTA method.
3. Estimation of copper content of the given solution by EDTA method.
4. Estimation of iron content of the given solution using potentiometer.
5. Conductometric precipitation titration using  $\text{BaCl}_2$  and  $\text{Na}_2\text{SO}_4$ .

**TOTAL: 30 PERIODS**



## **COURSE OUTCOMES**

- At the end of course the student will be able to know the concepts of water hardness and analyse various types of water.

**COURSE OBJECTIVES**

The student should be made to:

- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Learn to use Arrays, strings, functions, structures and unions.

**LIST OF EXERCISES**

**a) Word Processing 10**

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing - flow Chart

**b) Spread Sheet 10**

5. Chart - Line, XY, Bar and Pie.
6. Formula - formula editor.
7. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
8. Sorting and Import / Export features.

**c) Techpub software**

9. CorelDraw – SGML – Illustrator

**d) C Programming 10**

10. Data types, Expression Evaluation, Condition Statements.
11. Arrays
12. Structures and Unions
13. Functions
14. File Handling
15. Pointers

**TOTAL : 30 PERIODS**

## **COURSE OUTCOMES**

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

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs

## **LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

1. Standalone desktops with C compiler 30 Nos. (or)
2. Server with C compiler supporting 30 terminals or more.

**EN 15202**

**ENGLISH COMMUNICATION SKILLS LABORATORY**

**0 0 2 1**

## **OBJECTIVES:**

- To instill the basic communication concepts to enhance students' communication skills through various lab sessions.
- To help students develop the ability to communicate effectively in spoken English.
- To help students develop their soft skills and interpersonal skills.
- To increase employability by developing students' communication skills in English.

**UNIT I FORMAL & INFORMAL CONVERSATION PRACTICE 9**

Role Play conversations - with family members, neighbors, friends, relatives etc. Simple expressions - agreeing / disagreeing, persuading, wishing, consoling, advising, arguing, expressing opinions etc.- Professional dialogues with superiors - Conversation with different professionals in - Government and Corporate Offices, Official Meetings, Educational Institutions, (At the railway junction, malls, post office, bank) etc- every day usage of English

**UNIT II ORAL REVIEW, RADIO SHOW & NARRATIVE TECHNIQUES 9**

Oral review of books - Presentation of various radio programs like news, announcements, advertisements, entertainment programs etc. as a team activity. Understanding the basic narrative techniques - Narrating short stories. Narrating real life experiences, Oral interpretation of charts, tables, graphs.

**UNIT III RESUME / LETTER WRITING 9**

Preparation of resume - structure – Types of resume – writing the vision statement – Objectives – Types of Letter – Job Application – accepting / declining a Job offer.

**UNIT IV PRESENTATION SKILLS & GROUP DISCUSSION 9**

Elements of effective presentation – Structure of a presentation – Speech acts - effective use to presentation tools - Audience analysis – Preparing the PPT slides - Video samples- Importance of GD – in the selection process - Structure of a GD – Moderator – led and other GDs - Strategies in GD – Team work - Body Language - Mock GD -Video samples

**UNIT V INTERVIEW SKILLS 9**

Kinds of interviews – one to one, group interview, telephone interview, online interview, stress interview - Required Skills – Corporate culture – Mock interviews-Video samples.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

- Speak effectively and confidently in English.
- Attend job interviews with confidence.
- Write effective job applications with resume.

**TEXT BOOK:**

Kalpana. V & Co., “Communication Skills Laboratory Manual”, Vijay Nicole Imprints Pvt. Limited, Chennai. 2013

**REFERENCE BOOKS:**

1. Anderson, P.V. “Technical Communication”, Thomson Edition, New Delhi, 2007.
2. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005.
3. Kumar Sanjay, PushpLata, “Communication Skills (With CD)”, Oxford University Press, New Delhi. 2011.
4. Dutt, Kiranmai P and Geetha Rajeevan, “Basic Communication Skills”, Foundation Books, New Delhi. 2007.
5. Gupta, S.C., “Conversation Skills for All Occasions”, Arihant Publications India Pvt. Ltd, New Delhi. 2006.

**WEB LINKS:**

1. <http://writing-program.uchicago.edu/resources/grammar.htm>
2. <http://www.grammarbook.com/>
3. <http://www.myenglishteacher.eu/blog/english-grammar-9-websites-to-learn-and-practice-english-grammar/>