PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018
(AUTONOMOUS)
B.E. MECHANICAL ENGINEERING
REGULATONS 2015
CURRICULUM

SEMESTER – I

Course Code	Course Title	L	T	P	C
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 15101	Basic Electrical & Electronics Engineering	3	0	0	3
PC 15101	Physics & Chemistry Laboratory I	0	0	2	1
ME 15103	Computer Aided Drafting Laboratory	0	0	2	1
GE 15101	Engineering Practices Laboratory	0	0	4	2

SEMESTER – II

Course Code	Course Title	L	T	P	C
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

MA15101 MATRICES AND CALCULUS 3 2 0 4

(Common to all Branches)

OBJECTIVES:

To enable students to,

- understand the concepts of Eigen values and Eigen vectors of real matrices and its applications inthe process of diagonalization of real symmetric matrices.
- 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.
- learn the concept of partial differentiation and its applications to maxima and minima offunctions of two or more variables.
- develop a thorough knowledge of definite and indefinite integrals
- learn the concepts of multiple integrals and their applications

UNIT I MATRICES 9+6

Characteristic equation – Eigen values 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 coordinates – Change of order of integration – Change of variables between Cartesian and polar coordinates – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral.

TOTAL : 75 PERIODS

OUTCOMES:

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

- determine eigen values and eigen vectors and diagonalize real symmetric matrices.
- classify various types of functions involved in engineering fields, their differentiation techniquesand applications
- find partial derivatives and apply the same to find maxima and minima of two or more variables
- implement different methods of integration used in engineering problems
- execute suitable integration techniques to calculate surface areas and volumes.

BOOKS:

1. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi,(2011).
2. P.Jayakumar, B.Kishokkumar and M.Vimala, "Mathematics -I", Global Publishers, Chennai.,(2014).

REFERENCES:

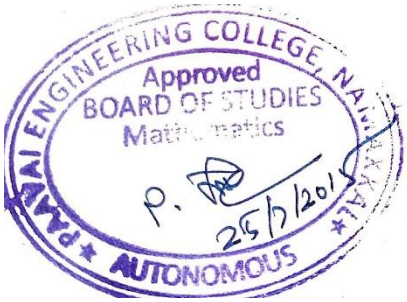
1. T. Veerarajan., "Engineering Mathematics", 3rd Edition, Tata McGraw Hill, (2011).
2. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th Edition, Wiley Publications.

3. Dass, H.K., and Er. RajnishVerma," Higher Engineering Mathematics", S. Chand Private Ltd.,(2011).

4. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education,(2012).

5. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, (2008).

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	3



EN15101 TECHNICAL ENGLISH I 3 0 0 3

COURSE OBJECTIVES:

To enable students to

- impart knowledge about the importance of vocabulary and grammar.
- help the students of engineering and technology develop a strong base in the use of English.
- improve the reading skills of the students so as to enable them to communicate with confidence in English.
- develop their basic speaking skills in order to deliver impromptu talks, participate with confidence in conversations.
- enable students to write / draft effective essays and emails for effective communication.

UNITI VOCABULARY&GRAMMAR 9

General Vocabulary - Prefixes & Suffixes - Words used as nouns and verbs - Adjectives - Comparative adjectives - Phrasal verbs- Acronyms - Abbreviations -Tenses - Active and Passive voice - Modal verbs and Probability - Cause and Effect expressions - subject-verb agreement - yes or no questions - gerund and infinitives - imperative sentences - Prepositions-developing hints-reading short passages in English and answering multiple choice questions.

UNITII LISTENING 9

Listening and transferring of information, listening to dialogues, listening to informal conversation-listening to short talks and answering questions- understanding the structure of conversations- telephone etiquette.

UNITIII READING 9

Reading – Sub-Skills of reading-skimming-scanning-predicting-Reading comprehension (multiple choice and open-ended questions) with multiple choice questions. – analyzing the use of language in advertisements- –interpreting visual information - Flow Chart, Pie Chart, Graph, Bar Chart (Transcoding)

UNITIV WRITING 9

Informal letters/ emails- writing recommendations, checklists - instructions – note making-note taking-minutes of Meeting-use of cohesive devices and reference words- essay writing – different types of essays – - Summarywriting.

UNITV SPEAKING 9

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.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

- use suitable vocabulary and grammar with confidence and express their ideas both in speech and writing.
- listen and comprehend classroom lectures, short talks and conversations.
- read, interpret and analyze a given text effectively, and use cohesive devices in spoken and written English.
- understand English and converse effectively.
- write flawless sentences, essays and letters.

TEXT BOOKS:

1. Elango.K, & Co., "Resonance" Cambridge University Press India Pvt.Ltd. New Delhi, 2013.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011.

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, NewDelhi2001.

	Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													
COs	**Programmes Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	2	-	2	2	1	-	-
CO2	-	-	-	-	2	3	2	3	1	3	1	-	-	-
CO3	-	-	-	3	-	2	-	2	2	2	2	2	-	-
CO4	-	-	-	-	-	2	2	2	1	3	1	1	-	-
CO5	-	-	-	2	-	-	-	3	3	-	3	1	-	-

PH 15101 **ENGINEERING PHYSICS** **3 0 0 3**
(COMMON TO ALL BRANCHES)

COURSE OBJECTIVES

To enable the students to

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

UNIT I PROPERTIES OF MATTER 9

Introduction- Elasticity–Hooke's law – relationship between three modulii 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_2, 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

At the end 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.

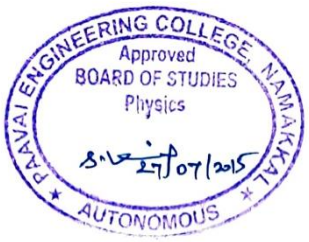
TEXT BOOKS

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.

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs		**Programmes Outcomes (POs)**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	2	3	-	3	-	-	2	-	-
CO2	-	-	2	-	-	2	-	-	-	-	2	2	-	-
CO3	3	-	2	3	-	2	-	-	-	-	2	2	-	-
CO4	3	3	2	-	-	2	3	-	3	-	2	2	-	-
CO5	3	3	-	-	3	-	-	-	3	-	2	-	-	-



CH 15101 ENGINEERING CHEMISTRY – I 3 0 0 3

(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 transistion: 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 trasitions. 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 ArunBahl., Essential of Physical Chemistry, S.Chand& Co. Ltd., New Delhi. (2010).
5. Geofrey A ozin, Andre Arsonault and Ludovic academariti. "A chemical approach to nanomaterials", Chemistry for Royal society Revised edition London, (2009).

Mapping of course outcome with Programme Outcomes
(S/M/W indicates strength of correlation) S-Strong-3, M-Medium=2 , W-Weak=1.

CO	Programmes Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	1	3	3	2	-	1	2	-	-
CO2	2	-	2	3	-	1	-	3	1	2	2	1	-	-
CO3	2	2	-	1	2	1	3	2	1	2	1	1	-	-
CO4	2	2	2	-	2	1	3	3	-	2	-	3	-	-
CO5	-	2	-	-	-	1	3	3	2	2	1	2	-	-

ME 15101 ENGINEERING GRAPHICS 3 2 0 4

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 persception 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 squad 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 visualray 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.

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	3	1	-	-	-	-	1	1	2	1
CO2	3	3	3	3	3	1	-	-	-	-	1	1	2	1
CO3	3	3	3	3	3	1	-	-	-	-	1	1	2	1
CO4	3	3	3	3	3	1	-	-	-	-	1	1	2	1
CO5	3	3	3	3	3	1	-	-	-	-	1	1	2	1

EE 15101 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING 3 0 0 3

(Common to Mechanical / Mechatronics/ Aeronautical / Agricultural Engineering)

COURSE OBJECTIVES

- To analyze the various AC and DC circuits and find the circuit parameters.
- To introduce the principles of AC &DC fundamentals.
- To familiarize the relationship between Electric and Magnetic circuits.
- To study the basics of electronic devices and its applications.
- To study various number systems and to realize the logic functions by using various gates.

UNIT I ELECTRICITY AND MAGNETISM 9

Coulomb's law, Flemings law, lenz law–Properties of Magnets, Laws of Magnetism, flux, flux density, Field strength, Permeability, Reluctance, Permeance, Types of Magnetic circuits – Comparison of Magnetic and Electric Circuits. Self and Mutual Inductance – Self and mutually induced emf.

UNIT II AC & DC CIRCUITS FUNDAMENTALS 9

AC Waveforms – RMS and Average value, Form Factor, Peak Factor. Single Phase AC Circuits – RL, RC, RLC series and parallel circuits– Impedance, Power, Power factor, Series and Parallel Resonance - Problems. Introduction to three phase AC circuits. DC: Ohm's Law, Limitations of Ohm's Law, Kirchhoff's' Laws, series– parallel resistive circuits, comparison of series and parallel circuits, Star - Delta Transformation – Problems.

UNIT III MEASUREMENTS 9

Types of electrical measurement – Construction and Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters. Types of errors.

UNIT IV SEMICONDUCTOR DEVICES 9

Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics - Half wave and Full wave Rectifiers - Voltage Regulation.Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal Amplifier.

UNIT V DIGITAL ELECTRONICS 9

Binary Number System - Logic Gates - Boolean Algebra - Half and Full Adders - Flip-Flops - Registers and Counters - A/D and D/A Conversion.

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of course, the student will able to

- analyze the various AC and DC circuits and find the circuit parameters.
- describe the principles of AC &DC fundamentals.
- explain the relationship between Electric and Magnetic circuits.
- describe the basics of electronic devices and its applications.
- Enumerate various number systems and to realize the logic functions by using various gates.

TEXT BOOKS

1. Muthusubramanian,R, Salivahanan,S and Muraleedharan,K.A, Basic Electrical, Electronics andComputer Engineering ,Tata McGraw Hill, Second Edition, (2006).
2. J.B. Gupta, A Textbook of Basic Electrical and Electronics Engineering, S.K. Kataria& Sons;Reprint 2013 edition (2013).

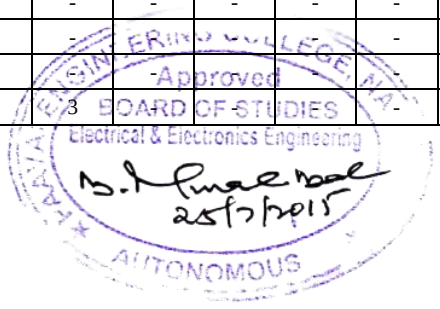
REFERENCES

1. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
2. Mehta V K, "Principles of Electronics", S.Chand& Company Ltd, 3rd Edition.
3. MahmoodNahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGrawHill, (2002).
4. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers, (2003).

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	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	3	3	3	-	-	-	-	-	-	3	1	2
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	2
CO3	3	3	3	3	-	-	-	-	-	-	3	3	1	2
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	2
CO5	3	3	3	3	-	3	-	-	-	-	-	3	1	2



PC15101 PHYSICS AND CHEMISTRY LABORATORY –I 0 0 2 1

(COMMON TO ALL BRANCHES)

PHYSICS LABORATORY- I

COURSE OBJECTIVES

To enable the students to

- compile various experiments to enhance the basic understanding and concepts of physics in properties ofmatter, sound, light, thermal physics and electricity.
- learn the concept of ultrasonic waves in liquid using ultrasonic interferometer.

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

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

- apply Physics principles to evaluate mechanical, electrical, thermal and optical characteristics of materials.
- determine the velocity of ultrasonic waves, compressibility of the given liquid.

CHEMISTRY LABORATORY-I

COURSE OBJECTIVES.

To enable the students to

- analyze the hardness of water, impurities in water, water quality parameters and nature of chemicals in neutral medium.
- understand the concept of acids and bases, their importance in water.

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.

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TOTAL : 30 PERIODS

COURSE OUT COMES

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

- know the quality of water and chemical processtaking place in different medium.
- gain analytical skills on identification of parameters in water.

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	3	-	3	-	2	-	-	-	-	-	-	-
CO2	2	-	3	2	-	-	-	-	-	-	-	-	-	-
CO3	-	2	1	1	2	-	2	-	-	-	-	-	-	-
CO4	3	2	-	-	3	-	-	-	-	-	-	-	-	-

ME 15103 COMPUTER AIDED DRAFTING LABORATORY 0 0 2 1

COURSE OBJECTIVES

- To prepare assembly drawings both manually and using standard CAD packages
- To familiarize the students with Indian Standards on drawing practices and standard components
- To gain practical experience in handling 2D drafting and 3D modeling software systems.
- To make the students understand and interpret drawings of machine components.

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, anddimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block,Base of a mixie, 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

COURSE OUTCOMES

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

- Develop competency in basic drafting, enabling them to pursue careers in engineering, professionalarenas, or to further their academic pursuits.
- Follow the drawing standards, Fits and Tolerances
- Re-create part drawings, sectional views and assembly drawings as per standards
- Draw 2 D and drawing using CAD software.

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CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Cos	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	3	1	-	-	-	-	1	1	2	1
CO2	3	3	3	3	3	1	-	-	-	-	1	1	2	1
CO3	3	3	3	3	3	1	-	-	-	-	1	1	2	1
CO4	3	3	3	3	3	1	-	-	-	-	1	1	2	1

GE15101 ENGINEERING PRACTICES LABORATORY 0 0 4 2

(COMMON TO ALL BRANCHES)

COURSE OBJECTIVES

To enable the students to

- develop their knowledge in basic civil engineering practices such as plumbing, carpentry and its tool usages.
- practice some of mechanical basics such as welding, basic machining, sheet metal work, fitting.
- experience with basic electrical wiring circuits
- know about the electronic components, color coding signal generation, soldering practice..

GROUP A (CIVIL AND MECHANICAL)

I CIVIL ENGINEERING PRACTICE

BUILDINGS

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

PLUMBING WORKS

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

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, Facing, Thread cutting 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.

TOTAL: 30 PERIODS

GROUP B (ELECTRICAL AND 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 signalparameter (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: 30 PERIODS

COURSE OUTCOMES

At the end of this course, students will be able to

- use the tools for plumbing and carpentry works
- prepare models by -welding, machining, sheet metal and fitting
- construct electrical wiring circuit and demonstrate practically
- analyse the signal generation, solder the electronic components based on the circuits

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	2	2	2	-	-	-	1	-	-	1	2	3
CO2	2	2	2	2	2	-	-	-	1	-	-	1	2	3
CO3	2	2	2	2	2	-	-	-	1	-	-	1	2	3
CO4	2	2	2	2	2	-	-	-	1	-	-	1	2	3

MA15201 DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS 3 2 0 4
(Common to all Branches)

OBJECTIVES:

To enable the students to

- make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- develop an understanding of the standard techniques of complex variable theory so as
- enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
- 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 parallelpipeds.

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 : 75 PERIODS

OUTCOMES:

At the end 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", 41st Edition, Khanna Publications, Delhi,(2011).
2. P.Jayakumar, B.Kishokkumar and M.Vimala, "Mathematics -II", Global Publishers, Chennai.,(2014).

REFERENCES:

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

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	3	-	-	-	-	-	-	-	2	3	3
CO2	3	2	3	2	-	-	-	-	-	-	-	3	3	3
CO3	3	3	3	2	-	-	-	-	-	-	-	2	3	3
CO4	3	2	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	2	3	-	-	-	-	-	-	-	3	3	3

EN15201 TECHNICAL ENGLISH II 3 0 0 3

COURSE OBJECTIVES:

To enable students to

- impart knowledge about the importance of vocabulary and grammar.
- help the students of engineering and technology develop a strong base in the use of English.
- improve the reading skills of the students so as to enable them to communicate with confidence in English.
- develop their basic speaking skills in order to deliver impromptu talks, participate with confidence in conversations.
- enable students to write / draft effective essays and emails for effective communication.

UNIT I VOCABULARY AND GRAMMAR 9

General Vocabulary, Adverbs – appropriate word order to form sentences – Collocation - Compare and contrast -Idioms and their usage - compound nouns -Numerical expression -Purpose expression -Articles - Relative pronoun -Reported speech - Discourse markers- If conditional sentences – Editing-Wh Questions – One word Substitution

UNIT II LISTENING 9

Listening to news and announcements, listening to a telephone conversation- Listening to model interviews –TED Talks- Interview Techniques

UNIT III READING 9

Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading-Reading articles in newspapers, journals, manuals- critical reading.

UNIT IV WRITING 9

Business letters – Inviting Quotations, Placing Orders, writing official letters- complaint letters, invitation letters- requisition letters – writing a job application- Resume -Technical Report Writing – (Feasibility Reports, Accident Report, Survey Report)

UNIT V SPEAKING 9

Syllable - Stress- Intonation- Silent Letters - Presentations on a given topic - Mini presentation in small groups – group discussions- mock interviews.

TOTAL : 45 PERIODS

COURSE OUTCOMES :

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

- Speak with clarity andconfidence
- Write comprehensive and grammatically correct reports, job applications and draft e- mails.
- Make effective presentations using powerpoint.
- Participate successfully in GroupDiscussions.
- understand English and converse effectively.

TEXT BOOKS:

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

2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai,2011.

REFERENCE BOOKS:

1. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles andPractice. 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.

	Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													
COs	**Programmes Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	2	-	2	2	1	-	-
CO2	-	-	2	-	-	3	2	3	1	3	-	-	-	-
CO3	-	-	-	3	-	2	-	2	2	2	2	2	-	-
CO4	-	-	-	-	-	2	2	2	1	3	-	-	-	-
CO5	-	-	-	2	-	-	-	3	3	3	3	-	-	-

PH 15202 APPLIED PHYSICS 3 0 0 3

(COMMON TO AERO, AGRI, CHEMICAL, CIVIL, MCT &MECH)

COURSE OBJECTIVES

To enable the students to

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

At the end 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.

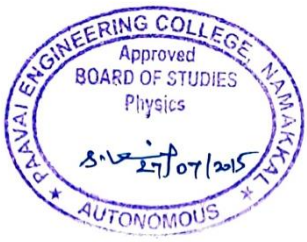
TEXT BOOKS

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, 7th 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.

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programmes Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	3	-	-	-	2	-	-	-	-	-	-	-
CO2	3	-	3	2	-	-	-	-	-	-	-	-	-	-
CO3	-	2	3	1	-	-	2	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	-	2	3	1	-	-	-	-	-	-	-	-	-	-



CH 15201 ENGINEERING CHEMISTRY – II 3 0 0 3

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 – 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, oilyness) – 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, 15th 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).

Mapping of course outcome with Programme Outcomes (S/M/W indicates strength of correlation) S-Strong-3, M-Medium=2 , W-Weak=1.														
CO	**Programmes Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2	2	1	2	1	3	1	2	-	1	2	-	-
CO2	3	-	1	3	-	1	-	3	1	2	2	3	-	-
CO3	2	2	1	1	2	1	3	2	1	2	1	1	-	-
CO4	1	-	2	2	2	1	2	3	-	1	-	2	-	-
CO5	-2	2	-	-	-	1	3	2	2	2	1	2	-	-

CS15101 / CS15201 COMPUTER PROGRAMMING 3 0 0 3

COURSE OBJECTIVES

The students should be made to:

- learn the organization of a digital computer.
- be exposed to the number systems.
- learn to think logically and write pseudo code or draw flow charts for problems.
- be exposed to the syntax of C.
- learn to use arrays, strings, functions, pointers, structures and unions in C.

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 andOutput operators – Decision Making - Branching and Looping.

UNIT III ARRAYS AND STRINGS 9

Array Concepts- Two Dimensional Array - Passing Arrays to Functions - Multi Dimensional Array. StringOperations - 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, Arrayof Structure. File Handling Functions.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- design C Programs for problems.
- write and execute C programs for simple applications
- logically and draw flow charts for problems
- write pseudo code or draw flow charts for problems
- use arrays, strings, functions, pointers, structures

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", FirstEdition, Oxford University Press, 2009.
3. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

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. BrianW. Kernighan and Dennis M.Ritchie,"The C Programming Language",PearsonEducation 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, Fiveth Reprint, 2009.

WEB LINKS:

1. http://www.nptel.ac.in/
2. http://www.tutorialspoint.com/cprogramming/cprogramming_tutorial.pdf
3. https://www.youtube.com/watch?v=QsBVjhRlfh8

Mapping of Course Outcomes with Programming Outcomes **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**														
COs	**Programme Outcomes(POs)**												**Programme Specific Outcomes (PSOs)**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	3	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	1	-	-	-	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3	3	2

ME 15201 ENGINEERING MECHANICS 3 2 0 4

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

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	3	2	-	-	-	-	-	-	2	2	3
CO2	3	3	3	3	2	-	-	-	-	-	-	2	2	3
CO3	3	3	3	3	2	-	-	-	-	-	-	2	2	3
CO4	3	3	3	3	2	-	-	-	-	-	-	2	2	3
CO5	3	3	3	3	2	-	-	-	-	-	-	2	2	3

PC 15201 PHYSICS AND CHEMISTRY LABORATORY -II 0 0 2 1

(COMMON TO ALL BRANCHES)

PHYSICS LABORATORY- II

COURSE OBJECTIVES

To enable the students to

- assess various experiments to enhance the basic understanding and concepts of physics in properties of matter, optics and semiconductor.
- acquire the concept of moment of inertia and rigidity modulus using torsional pendulum.

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

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

- apply physics principles to perceive mechanical,electrical, and optical characteristics of materials.
- determine the moment of inertia and rigidity modulus of the given material.

CHEMISTRY LABORATORY-II

COURSE OBJECTIVES

To enable the students to

- develop the practical knowledge through the instrumental methods of chemical analysis, role of chemistry in engineering applications and environmental impact of water.
- acquaint the students on handling instruments for chemical analysis.

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 $BaCl_2$ and Na_2SO_4.

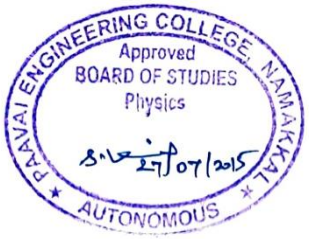
TOTAL: 30 PERIODS

COURSE OUTCOMES

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

- know the concepts of water hardness and analysevarious types of water.
- familiar on instrumental analysis method for the presence of metals.

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programmes Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	3	-	-	-	2	-	-	-	-	-	-	-
CO2	2	-	2	2	-	-	-	-	-	-	-	-	-	-
CO3	-	3	3	1	-	-	2	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	-



CS15102/CS15202 COMPUTER PROGRAMMING LABORATORY 0 0 2 1

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 PERIODS: 30

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

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CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	1	-	-	-	-	-	-	-	-	2	3	3
CO4	1	3	3	3	-	-	-	-	-	-	-	2	1	3

EN15202 ENGLISH COMMUNICATION SKILLS LABORATORY 0 0 2 1

COURSE OBJECTIVES:

To enable the students to

- Instillthebasiccommunicationconceptstoenhance students' communication skillsthroughvariouslabsessions.
- HelpstudentsdeveloptheabilitytocommunicateeffectivelyinspokenEnglish.
- Helpstudentsdeveloptheirsoft skillsandinterpersonal skills.
- Increaseemployabilitybydeveloping students' communication skillsinEnglish.

UNITI FORMAL& INFORMALCONVERSATIONPRACTICE 9

Role Play conversations - with family members, neighbors, friends, relatives etc. Simple expressions - agreeing/disagreeing,persuading,wishing,consoling,advising,arguing,expressingopinionsetc.-Professional dialogues withsuperiors - Conversation with different professionals in - Government andCorporate Offices, Official Meetings, Educational Institutions, (At the railway junction, malls, post office,bank) etc-everydayusage ofEnglish

UNITIIORALREVIEW,RADIO SHOW&NARRATIVETECHNIQUES 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 – Narratingshort stories,Narratingreallifeexperiences, Oralinterpretationofcharts,tables,graphs.

UNITIII RESUME /LETTERWRITING 9

Preparation of resume- structure – Types of resume – writing the vision statement – Objectives – Types ofLetter –Job Application–accepting/declineingaJoboffer.

UNITIVPRESENTATIONSKILLS & GROUPDISCUSSION 9

Elements of effective presentation – Structure of a presentation – Speech acts - effective use to presentationtools - Audience analysis – Preparing the PPT slides - Video samples- Importance ofGD –in the selectionprocess - Structure of a GD – Moderator – led and other GDs - Strategies in GD – Team work – BodyLanguage-MockGD-Video samples

UNITVINTERVIEW SKILLS

Kindsofinterviews–onetoone,groupinterview,telephoneinterview,onlineinterview,stressinterview-RequiredSkills– Corporateculture–Mockinterviews-Videosamples.

COURSE OUTCOMES:

- listen and comprehend classroom lectures, short talks and conversations.
- read, interpret and analyze a given text effectively, and use cohesive devices in spoken and written English.
- understand English and converse effectively.
- write flawless sentences, Job application.

TEXTBOOKS:

- Kalpana.V&Co.,"CommunicationSkillsLaboratoryManual",VijayNicoleImprintsPvt.Limited, Chennai.2013
- Rizvi,Ashraf. M.Effective Technical Communication.TataMcGraw-Hill,NewDelhi.2005.

REFERENCEBOOKS:

- Anderson,P.V."TechnicalCommunication",ThomsonEdition,NewDelhi,2007.
- KumarSanjay,PushpLata,"CommunicationSkills(WithCD)",OxfordUniversityPress, NewDelhi.2011

	Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													
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	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	2	2	3	3	1	-	-
CO2	-	-	-	2	3	-	1	2	-	3	3	1	-	-
CO3	-	-	-	-	-	-	-	-	-	3	1	1	-	-
CO4	-	-	-	-	3	1	1	-	2	3	3	1	-	-