PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018

(AUTONOMOUS)

B.Tech. CHEMICAL ENGINEERING

CURRICULUM

CBCS REGULATIONS 2016

SEMESTER I

Course Code	Course Title	L	T	P	C
MA16101	Matrices and Calculus	3	2	0	4
EN16101	Technical English I	3	0	0	3
PH16101	Engineering Physics	3	0	0	3
CH16101	Engineering Chemistry I	3	0	0	3
CS16101	Computer Programming	3	0	0	3
ME16102	Basic Civil and Mechanical Engineering	3	0	0	3
PC16101	Physics and Chemistry Laboratory I	0	0	2	1
CS16102	Computer Programming Laboratory	0	0	2	1
GE16101	Engineering Practices Laboratory	0	0	4	2

SEMESTER II

Course Code	Course Title	L	T	P	C
MA16201	Differential Equations and Complex Analysis	3	2	0	4
EN16201	Technical English II	3	0	0	3
PH16202	Applied Physics	3	0	0	3
CH16201	Engineering Chemistry II	3	0	0	3
ME16202	Engineering Graphics	3	2	0	4
EE16201	Circuit Theory	3	2	0	4
PC16201	Physics and Chemistry Laboratory II	0	0	2	1
EE16202	Electric Circuits Laboratory	0	0	2	1
EN16202	English Communication Skills Laboratory	0	0	2	1

MA 16101 **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 applications of Rolle's and Mean Value Theorems and also to understand the concept ofmaxima and minima using derivatives.
- 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 **15**

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 orthogonaltransformation.

UNIT II DIFFERENTIAL CALCULUS **15**

Limit – Continuity, properties of limit and classification of discontinuities - Simple problems. Differentiation – Standard forms, Successive differentiation and Leibnitz theorem**.** Mean value theorem – Rolle's theorem – maxima, minima using first and second derivative tests.

UNIT III FUNCTIONS OF SEVERAL VARIABLES **15**

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 **15**

Indefinite and definite integrals - Properties of integrals, Integration of simple function. Methods of Integration – Integration by parts – Reduction formulae involving exponential and trigonometric functions, Bernoulli'sformula.

UNIT V MULTIPLE INTEGRALS **15**

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

TOTAL : 75 PERIODS

OUTCOMES

At the end of this 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.

TEXT BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications,Delhi, (2011).
2. P.Jayakumar, and Dr.B.Kishokkumar "Matrices and Calculus", Global Publishers, Chennai.,(2015).
3. T. Veerarajan., "Engineering Mathematics", 3rd Edition, Tata McGraw Hill, (2011).

REFERENCES

1. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th Edition, WileyPublications.
2. Dass, H.K., and Er. RajnishVerma, "Higher Engineering Mathematics", S. Chand Private Ltd.,(2011).
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education,(2012).
4. 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	2	-	-	-	-	-	-	-	1	2	3
CO2	3	3	2	3	-	-	-	-	-	-	-	1	2	3
CO3	3	2	2	3	-	-	-	-	-	-	-	1	2	3
CO4	3	2	3	1	-	-	-	-	-	-	-	1	2	3
CO5	3	2	2	2	-	-	-	-	-	-	-	1	2	3

EN16101 TECHNICAL ENGLISH I 3 0 0 3

(Common to all Branches)

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 & GRAMMAR 9

General Vocabulary - Prefixes & Suffixes - Words used as nouns and verbs - 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.

UNIT II 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 etiquettes - note taking.

UNIT III READING 9

Reading - Sub-Skills of reading - skimming - scanning - predicting - Reading comprehension - reading short passages in English and answering multiple choice questions / open-ended questions - Analyzing the use of language in advertisements - Interpreting Visual Information - Flow Chart, Pie Chart, (Transcoding).

UNIT IV WRITING 9

Informal letters - email communication - Developing hints - Writing Instructions, Recommendations – Note Making - Minutes of the Meeting - Use of cohesive devices and reference words - Essay writing - different types of essays - summary writing.

UNIT V SPEAKING 9

Self introduction - Personal information - Name, background, study details, areas of interest, hobbies, strengths and weaknesses, role model and future ambition -Role Play- Presentation on a given topic- Group Discussion skills- fundamentals of GD.

TOTAL PERIODS 45

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 BOOK

1. Mahalakshmi.S.N. English and Workbook for Engineers. V.K. Publications, Sivakasi. 2017.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai.2011.

REFERENCES

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. 2001.
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		Programme 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	-	-

PH16101 **ENGINEERING PHYSICS** **3 0 0 3**

(COMMON TO ALL B RANCHES)

COURSE OBJECTIVES

To enable the students to

- understand the basic concepts in properties of matter.
- acquire 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, the 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.

	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 16101 **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- Functionality – Degree of polymerization: Types of polymerization and Mechanism of 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. Plastics-Thermoplastics and Thermosetting plastics -Preparation, properties and uses of Nylon 6:6, Teflon, epoxy resin and polycarbonate (Lexan)-Compounding of Plastics-Constituents and functions -Fabrication methods of Plastics.

UNIT II CHEMICAL THERMODYNAMICS 9

Terminology of thermodynamics-First law- 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 WATER TECHNOLOGY AND SPECTROSCOPIC TECHNIQUES 9

Water quality standards-Hardness of water-Types-expression-units-$CaCO_3$equivalence-problems and disadvantages- Water quality parameters and their determination methods-Titremetry,ElectroUV and AAS-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. Estimation of iron by colorimetry – flame photometry principles and instrumentation (block diagram only) - estimation of sodium by flame photometry –

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- 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. Nanoscale materials- particles: cluster, rods, tubes(CNT) and wires. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrode deposition, chemical vapour deposition, laser ablation; Properties and applications in electronics and communication, Energy sciences and risk discussion and future perspectives.

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 Ludovicacademariti. “A chemical approach to nanomaterials”, Chemistry for Royal society Revised edition London, (2009).

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	-	-	-	-	-	1	2	-	2	-	-	1	-	-
CO2	-	-	2	-	-	1	-	-	-	-	1	1	-	-
CO3	2	-	2	2	-	1	-	-	-	-	1	2	-	-
CO4	2	-	2	-	-	1	2	-	-	-	1	1	-	-
CO5	-	1	-	-	-	1	2	-	2	-	1	-	-	-

CS16101 **COMPUTER PROGRAMMING** **3 0 0 3**

(COMMON TO CSE/ECE /EEE/CHEMICAL/IT)

COURSE OBJECTIVES

- To learn the organization of a digital computer.
- To be exposed to the number systems.
- To think logically and write pseudo code or draw flow charts for problems.
- To be familiar with programming in C.
- 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 ofSoftware – 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 (notdetailed 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 this course, the students will be able to

- gain knowledge about number systems.
- work in office package.
- understand basic concepts of C programs.
- obtain knowledge about user defined function and scope of variables in C.
- acquire knowledge for handling arrays, strings, functions, pointers, structures and unions in C.

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.
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",PearsonEducationInc., (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.

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	1	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	1	2	1	-	-	-	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	1	1	3
CO5	3	1	3	-	-	2	-	-	-	-	-	3	3	2

ME16102 BASIC CIVIL AND MECHANICAL ENGINEERING 3 0 03

(COMMON TO CSE / EEE / CHEMICAL)

COURSE OBJECTIVES

- To impart basic knowledge of surveying and various civil engineering materials.
- To understand the basic components involved in buildings, dams and bridges
- To gain knowledge of different power plants and their working principles
- To understand the basic working principles of IC engines and boilers
- To distinguish between different types of Refrigeration and Air conditioning systems

A CIVIL ENGINEERING

UNITI SURVEYING AND CIVIL ENGINEERING MATERIALS 9

Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples. Civil Engineering Materials: Bricks –stones – sand – cement – concrete – steel sections.

UNITII BUILDING COMPONENTS AND STRUCTURES 9

Foundations: Types, Bearing capacity – Requirement of good foundations. Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

B MECHANICAL ENGINEERING

UNITIII POWER PLANT ENGINEERING 9

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric, Solar and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNITIV IC ENGINES 9

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNITV REFRIGERATION AND AIR CONDITIONING SYSTEM 9

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- analyze different surveying methods and understanding of various Civil EngineeringMaterials

- interpret the significance of various components of buildings, dams and bridges
- identify the components used in various power plant cycles.
- distinguish between petrol, diesel, 2-Stroke and 4-StrokeEngines
- explain the components of refrigeration and Air conditioning cycle.

TEXT BOOKS

1. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi,1996.
2. Venugopal K and Prahu Raja V, "Basic Mechanical Engineering", Anuradha Publishers, kumbakonam2000.

REFERENCES

1. C.-J. Winter, Rudolf L. Sizmann, Lorin L. Vant-Hull, Solar Power Plants: Fundamentals, Technology, Systems, Economics, Springer Science & Business Media,06-Dec-2012.
2. Seetharaman S. "Basic Civil Engineering", Anuradha Agencies,2005.
3. Shantha Kumar S R J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai2000.
4. Ramamrutham. S, "Basic Civil Engineering", DhanpatRai Publishing Co. (P)Ltd.1999.
5. V. Rameshbabu, "Basic Civil and Mechanical Engineering", VRB Publishers (P) Ltd., Chennai, 2009

WEBLINKS

1. http://www.aboutcivil.org/
2. http://www.nptel.ac.in/courses/105107122/
3. http://nptel.ac.in/courses/112105128/

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	1	-	-	-	-	-	-	-	1	2	1
CO2	2	2	2	1	-	-	-	-	-	-	-	1	2	1
CO3	2	2	2	1	-	-	-	-	-	-	-	1	2	1
CO4	1	2	2	-	2	-	2	-	-	-	-	1	2	1
CO5	2	2	2	-	2	-	-	-	-	-	-	1	2	1

PC16101 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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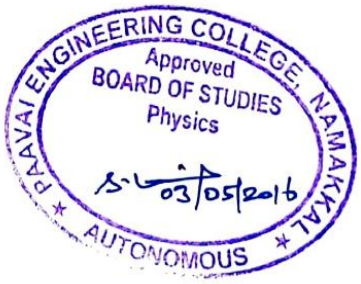
TOTAL : 30 PERIODS

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	-	-	-	-	-	-	-	-	-



CS16102 **COMPUTER PROGRAMMING LABORATORY** **0 0 2 1**

(COMMON TO CSE/ECE /EEE/CHEMICAL/IT)

COURSE OBJECTIVES

- To be familiar with the use of word processing software.
- To get exposure in presentation and visualization tools.
- To understand the problem solving techniques and flow charts.
- 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 Programming **10**

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

COURSE OUTCOMES

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

- execute the word processing programs.
- execute C programs for simple applications.
- develop recursive programs.
- develop recursive programs.

TOTAL PERIODS: 30

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

GE16101 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

MA 16201 **DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS** **3 2 0 4**

(Common to all branches)

OBJECTIVES

To enable students to

- discuss a wide range of basic mathematical methods for solving different types of problems arising in the fields of Science, Mathematics and Engineering.
- acquire sound knowledge in solving ordinary differential equations that model engineering problems.
- understand the concept of vector calculus, which is applied in all engineering disciplines.
- know the standard techniques of complex variable theory.
- learn the purpose of using transforms and to create a new domain

UNIT I ORDINARY DIFFERENTIAL EQUATIONS 15

Higher order linear differential equations with constant coefficients – Method of variation ofparameters -Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constantcoefficients.

UNIT II VECTOR CALCULUS 15

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields.–Vectorintegration – verifications of Green's, Gauss divergence and Stokes' theorem – simple applications.

UNIT III ANALYTIC FUNCTIONS 15

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equationand Sufficient conditions (excluding proofs) – Harmonic and orthogonal propertiesof analytic

UNIT IV COMPLEX INTEGRATION 15

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula– Taylor and Laurent expansions – Singular points – Residues – Residue theorem –Contour integration.

UNIT V LAPLACE TRANSFORM 15

Laplace transform – Transform of elementary functions – Basic properties – 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 coefficientsusing Laplace transformation techniques.

TOTAL: 75 PERIODS

OUTCOMES

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

- solve differential equations
- study the basics of vector calculus comprising of gradient, divergence and curl and line, surface and volume integrals and the classical theorems.
- know the concepts of analytic functions and its properties and apply it in conformal mapping.
- gain knowledge in the basics of complex integration and the concept of contour integration which is an important tool for evaluation of certain integrals encountered in practice.
- solve Laplace transform and its properties and give sufficient exposure to the solution of certain linear differential equations.

TEXT BOOKS

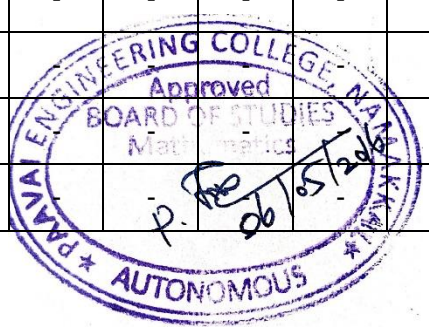
1. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi,(2011).
2. P.Jayakumar, and Dr.B.Kishokkumar, "Differential Equations and Complex Analysis", Global Publishers, Chennai.,(2015).
3. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th Edition, Wiley Publications.

REFERENCES

1. Dass, H.K., and Er. RajnishVerma, "Higher Engineering Mathematics", S. Chand Private Ltd.,(2011).
2. T. Veerarajan., "Engineering Mathematics", 3rd Edition, Tata McGraw Hill, 2011.
3. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage learning, (2012).
4. 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



EN16201 TECHNICAL ENGLISH II 3 0 0 3

(Common to all Branches)

COURSE OBJECTIVES

To enable students to

- help the students of engineering and technology to enhance their ability to listen, read, write and speak English.
- comprehend and write essays and prepare short project reports related to their branches of specialization.
- enhance their ability to read and comprehend technical texts.
- make effective presentations on topics in engineering and technology.
- participate successfully in Group Discussions.

UNIT I VOCABULARY & GRAMMAR 9

General Vocabulary- use of articles- different forms of a word (noun, verb) - Collocations - Fixed Expressions (adhere to, on the part of etc.)- Phrasal verbs - Compound nouns - Numerical Expressions - Direct and Indirect Speech - use of discourse markers - if conditionals- Cause and Effect expressions - Editing - Wh questions - One word substitution.

UNIT II LISTENING 9

Listening to news and announcements, listening to 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

Writing- Extended Definitions - Checklist, Recommendations -Formal letters- complaint letters, invitation letters- requisition letters - Writing a job application - Resume (Letter and Email format) - Technical Report Writing - (Industrial Visit, Accident, Feasibility & Project Reports) - Paragraph writing, Essay writing.

UNIT V SPEAKING 9

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

TOTAL PERIODS 45

COURSE OUTCOMES

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

- Speak with clarity and confidence.
- Read, interpret and analyse a given text.
- Write comprehensive reports, job applications and draft effective e-mails.
- Make effective presentations using power point.
- Participate successfully in Group Discussions.

TEXT BOOKS

1. Mahalakshmi.S.N. English Workbook for Engineers, V.K. Publications, Sivakasi.2017.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai.2011.

REFERENCES

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.

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	-	-	-	-	-	-	-	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	-	-	-

PH16202 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 indifferent 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 breakdownmechanisms 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)													
	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	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 16201 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 –Metallic and Non metallic coatings-Varnish-Lacquer-Hot dipping-Metal Clading-Electroplating(Au)-Galvanizing-Tinning-Electroless plating (Ni)– Paints – constituents and function .

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-Aniline point) – solid lubricants – graphite and molybdenum sulphide.

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 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	-	-	-	-	1	3	-	2	-	-	1	1	-
CO2	-	2	2	-	-	1	-	-	-	2	-	2	1	-
CO3	2	-	2	-	2	1	-	-	-	1	-	2	1	1
CO4	2	-	2	-	2	1	3	-	-	2	-	-	1	1
CO5	-	-	-	-	-	1	3	-	2	3	-	-	1	-

ME16202 **ENGINEERING GRAPHICS** **3 2 0 4**

(COMMON TO MECH / AGRI / CIVIL / MCT / ECE)

COURSE OBJECTIVES

- To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
- To impart knowledge on the 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 14

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 14

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 12

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 14

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 14

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: 75 PERIODS

COURSE OUTCOMES

At the end of this course, the students 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 BOOKS

1. Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.
2. S.Prabhakaran, M.Makesh, V. Subburam, “Engineering Graphics”, Sams Publishers, Chennai, 2015.

REFERENCES

1. Gopalakrishnan 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.

WEBLINKS

1. http://www.nptel.ac.in/courses/112103019
2. http://www.engineeringdrawing.org/
3. http://www.mechanical.in/engineering-graphics/

PUBLICATION OF BUREAU OF INDIAN STANDARDS

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. 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

EE16201 **CIRCUIT THEORY** **3 2 0 4**

(COMMON TO EEE / CHEMICAL)

COURSE OBJECTIVES

- To understand the basics of circuit theory and analysis of electric circuits.
- To apply the network elements and theorems for the analysis of complex circuits.
- To analyse the coupled circuits using the series & parallel resonance circuit terminologies.
- To compute the transient responses of RLC circuits.
- To understand the concepts of power measurements.

UNITI BASICS OF CIRCUIT ELEMENTS AND ANALYSIS 15

Basics of circuit elements - Network reduction – voltage division – current division – Star – delta transformation - Ohm's Law – Kirchhoff's laws – DC and AC Circuits -Mesh current and node voltage method of analysis.

UNITII NETWORK THEOREMS 15

Thevenin's Theorem- Norton's Theorem- Superposition theorem- Maximum power transfer theorem, Reciprocity theorem, Substitution theorem, Compensation theorem, Millman's theorem, Tellegan's theorem– Statement, illustration. Application to DC and AC circuits.

UNITIII RESONANCE AND COUPLED CIRCUITS 15

Series resonance, parallel resonance – Q factor – Bandwidth.Self-Inductance – Mutual Inductance – Coefficient of coupling – dot rule – ideal transformer effective inductance of coupled coils in series & in parallel – Analysis of magnetic circuits.

UNITIV TRANSIENT CIRCUITS 15

Transient response of RL, RC and RLC circuits using Laplace transform for DC input and AC with sinusoidal input. Introduction to PSpice-Application to electrical circuits.

UNITV POWER MEASUREMENTS 15

Power, Power Factor and Energy, Power measurement by 3 volt meter and 3 ammeter method - Solution of three phase balanced circuits & unbalanced circuits – Three phase power measurement using 2 wattmeter method

TOTAL: 75 PERIODS

COURSE OUTCOMES

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

- understand the basic elements, laws and circuit solving methods.
- analyse the complex circuits using the network theorems.
- design the resonance circuit and calculate the inductance under coupled conditions.
- perform transient analysis of electrical circuits
- understand the concepts of power measurements.

TEXT BOOKS

1. Chakrabati A, Circuits Theory (Analysis and synthesis), Dhanpat Rai & Sons,2004
2. Sudhakar, A. and Shyam Mohan S.P, Circuits and Networks, Analysis and Synthesis, Tata McGraw Hill Publishing Company Ltd.,2010.
3. Arumugam,M and Prem Kumar, K, Electric Circuit Theory, Khanna Publishers,2013.

REFERENCES

1. William H. Hayt, Jack Kemmerly, Steven M. Durbin, Engineering Circuit Analysis, Tata McGraw Hill,2013.
2. Nahvi,M, Joseph Edminister and Uma Rao , K , Electric Circuits(Schaum's Series), Tata McGraw-Hill,2010.
3. B.L.Theraja and A.K.Theraja, Electrical Technology, Volume 1, S.Chand Publications,2008.
4. Charles K. Alexander, Mathew N.O. Sadik, "Fundamentals of Electric Circuits", TataMcGraw Hill,2003.
5. Paranjothi SR, "Electric Circuits Analysis," New Age International Ltd.,1996.

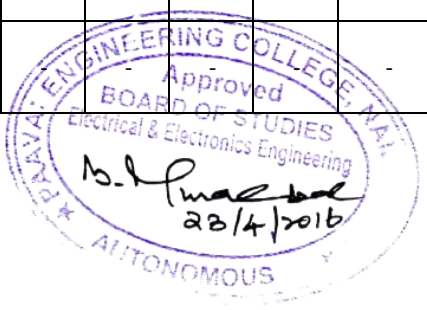
WEB LINKS

1. http://www.allaboutcircuits.com/vol_1
2. http://www.electronics-tutorials.ws/dccircuits
3. http://fourier.eng.hmc.edu/e84/lectures/ch2

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	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	2
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	2
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	2
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	2
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	2



PC 16201 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	-	-	-	-	-	-	-	-	-	-	-	-

EE16202 **ELECTRIC CIRCUITS LABORATORY** **0 0 21**

(COMMON TO EEE / CHEMICAL)

COURSE OBJECTIVES

- Understand basic laws
- Know basic theorems
- develop the practical knowledge through the simulation of electrical circuits,
- design of filters andverifying circuit theorems.

LIST OF EXPERIMENTS

1. Verification of Ohms law
2. Verification of Kirchoff's laws
3. Verification of Thevenin's & Norton's Theorem
4. Verification of Superposition theorem
5. Verification of Maximum Power Transfer theorem
6. Power measurement in 3 phase circuits
7. Design and simulation of Resonance circuits
8. Circuit Analysis using CRO
9. Digital simulation of Circuit Transients using PSpice /PSIM
10. Digital simulation of Network theorems using PSpice /PSIM

TOTAL: 30 PERIODS

COURSE OUTCOMES

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

- implement basic laws
- identify basic theorems
- develop the practical knowledge through the simulation of electrical circuits,
- design of filters andverifying circuit theorems

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	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	1	2
CO2	3	3	3	3	-	-	-	-	-	-	-	3	1	2
CO3	3	3	3	3	-	-	-	-	-	-	-	3	1	2
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	2

EN16202 ENGLISH COMMUNICATION SKILLS LABORATORY 0 0 2 1

COURSE OBJECTIVES:

To enable the students to

- Instill the basic communication concepts to enhance students' communication skills through various lab sessions.
- Help students develop the ability to communicate effectively in spoken English.
- Help students develop their soft skills and interpersonal skills.
- 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,expressingopinionsetc.-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 ofLetter –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 ofGD –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 VI NTERVIEW SKILLS

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

TOTAL: 30 PERIODS

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.

TEXT BOOKS:

- Kalpana.V&Co.,"Communication Skills Laboratory Manual", Vijay Nicole Imprints Pvt. Limited, Chennai.2013
- Rizvi,Ashraf. M.Effective Technical Communication.TataMcGraw-Hill, NewDelhi.2005.

REFERENCE BOOKS:

- Anderson,P.V."Technical Communication",Thomson Edition,NewDelhi,2007.
- Kumar Sanjay, PushpLata,"Communication Skills (With CD)",Oxford University Press, NewDelhi.2011

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