PAAVAI ENGINEERING COLLEGE, (AUTONOMOUS)
NAMAKKAL – 637 018

B.E. COMPUTER SCIENCE AND ENGINEERING

(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

REGULATIONS 2019
(CHOICE BASED CREDIT SYSTEM)

CURRICULUM

(For the candidates admitted during the Academic Year 2022-2023)

SEMESTER I

Course Code	Category	Course Title	L	T	P	C
EN20101	HS	English Communication Skills I	3	0	0	3
MA20101	BS	Matrices and Calculus	3	1	0	4
PH20101	BS	Engineering Physics	3	0	0	3
CH20101	BS	Engineering Chemistry	3	0	0	3
EE20101	ES	Basic Electrical Engineering	3	0	0	3
CS20102	ES	Programming in C	3	0	0	3
CH20102	BS	Chemistry Laboratory	0	0	2	1
CS20104	ES	Programming in C Laboratory	0	0	2	1
		TOTAL	**18**	**1**	**4**	**21**

SEMESTER II

Course Code	Category	Course Title	L	T	P	C
EN20201	HS	English Communication Skills II	3	0	0	3
MA20201	BS	Complex Variables and Differential Equations	3	1	0	4
PH20202	BS	Physics for Information Science	3	0	0	3
CS20202	ES	Data Structures	3	0	0	3
ME20201	ES	Engineering Graphics	2	1	0	3
MC20201	MC	Environmental Science and Engineering	3	0	0	0
PH20205	BS	Physics Laboratory	0	0	2	1
GE20201	ES	Engineering Practices Laboratory	0	0	4	2
CS20204	ES	Data Structures Laboratory	0	0	2	1
		TOTAL	**17**	**2**	**8**	**20**

EN20101 **ENGLISH COMMUNICATION SKILLS I** 3 0 0 3

(COMMON TO ALL BRANCHES)

COURSE OBJECTIVES

To enable the students to

- impart knowledge about the significance of vocabulary and syntax.
- develop a strong base in the use of English language.
- enrich the reading skills of the students so as to enable them to communicate with confidence in English.
- enhance their basic speaking skills in delivering impromptu talks and participating in conversations with confidence.
- draft effective essays and emails for effective communication.

UNIT I 9

Language focus - Word Formation, Prefix and suffix, Synonyms, Antonyms; Listening and transferring of information; Reading - Sub-skills of Reading, Skimming, Scanning, inferring; Writing -Defining , Describing gadgets, Process describing, providing examples or evidence; Speaking - Me Chart - personal information name, background, study details, areas of interest- speaking about one's hobbies, strengths and weaknesses, role model and future ambition.

UNIT II 9

Language focus - Spelling – Homophones - Homonyms - Word used as Nouns and Verbs - Comparative Adjectives ; Listening to dialogues; Reading short passages and answering multiple choice and open-ended questions; Writing - E-Mails, Letter inviting delegates, Accepting, Declining; Speaking - Simple Expressions.

UNIT III 9

Language focus - Phrasal verbs - Acronyms - Abbreviations - Tenses; Listening to informal conversation; Reading - Note Making, Jumbled Sentences, Writing - Use of Cohesive devices and reference words - Paragraph Writing - compare and contrast; Speaking - Discourse Markers, Role play.

UNIT IV 9

Language focus - Cause and Effect Expressions - Subject Verb Agreement - Wh questions - Yes or No questions - Listening to short talks and answering questions ;Reading - developing hints, - Writing - Instructions, Minutes of meeting ; Speaking - Narration of a story, Narrating an incident.

UNIT V 9

Language focus - Articles - Sentence Structures - Single line definition; Listening - Understanding the structure of conversations; Reading -, Interpreting visual information - Flow Chart, Pie Chart, Bar Chart and Tabular column; Speaking - Presentation Skills - Presentations on a given topic.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- develop vocabulary and grammar and express their ideas both in speech and writing.
- listen and comprehend classroom lectures, short talks and conversations.
- interpret and analyze a given text effectively, and use cohesive devices in spoken and written English.
- communicate appropriately and present on different topics.
- write minutes, essays and letters without errors.

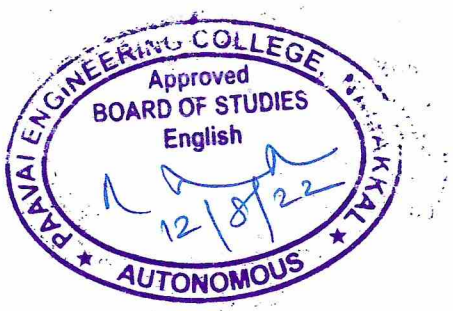
TEXT BOOKS

1. N P Sudharshana, C.Savitha. English Technical Communication. Cambridge University Press India Pvt.Ltd, New Delhi.2016.
2. Mahalakshmi.S.N. English and Workbook for Engineers. V.K. Publications, Sivakasi. 2017.

REFERENCE BOOKS

1. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice. Oxford University Press, New Delhi. 2011.
2. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005.
3. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi, 2001.

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



MA20101 **MATRICES AND CALCULUS** 3 1 0 4

(COMMON TO ALL BRANCHES)

OBJECTIVES

To enable the students to

- understand the concepts of Eigen values and Eigen vectors of real matrices and its applications in the process of diagonalization of real symmetric matrices.
- study applications of Rolle's and Mean Value Theorems and also to understand the concept of maxima and minima using derivatives.
- learn the concept of partial differentiation and its applications to maxima and minima of functions 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 12

Characteristic equation; Eigenvalues and Eigenvectors of a real matrix, Properties; Statement and applications of Cayley-Hamilton theorem; Diagonalisation of a real symmetric matrix by Similarity and Orthogonal transformation; Quadratic form - Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II DIFFERENTIAL CALCULUS 12

Limits and Continuity, properties of limit and classification of discontinuities; Tangent problems; Differentiation - Standard forms, Successive differentiation and Leibnitz theorem, Mean value theorem, Rolle's theorem, Maxima and Minima, Concavity.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 12

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 12

Area Problem - Indefinite and definite integrals; Properties of integrals; Methods of integration - Substitution method, Integration by parts, Bernoulli's formula; Reduction formulae involving exponential and trigonometric functions.

UNIT V MULTIPLE INTEGRALS 12

Double integration - Cartesian and polar coordinates, Change of order of integration, Change of Variables; Triple integration in Cartesian co-ordinates; Area as double integral; Volume as triple integral.

TOTAL PERIODS: 60

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 techniques and 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. Dr. P. Jayakumar, and Dr.B.Kishokkumar "Matrices and Calculus", Global Publishers, Chennai, (2015).
3. T. Veerarajan., "Engineering Mathematics", 3rd Edition, Tata McGraw Hill, (2011).

REFERENCE BOOKS

1. James Stewart, "Calculus ", 8th Edition, Cengage Learning, USA, 2015 reprint.
2. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th Edition, Wiley Publications.
3. Dass, H.K., and Er. Rajnish Verma, "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		Programmes Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	-	-

PH20101 **ENGINEERING PHYSICS** **3 0 0 3**

(COMMON TO ALL BRANCHES)

COURSE OBJECTIVES

To enable the students to

- understand the basic concepts of properties of matter.
- acquire the knowledge in the areas of ultrasonics and its applications.
- realize the dual nature of matter and applications of Schrodinger wave equation.
- categorize the types of laser and fiber optics.
- identify the different types of crystal structures and crystal growth techniques.

UNIT I PROPERTIES OF MATTER **9**

Elasticity: Hooke's Law - Stress - Strain Diagram; Young's modulus: theory and experiment (uniform and non-uniform bending) ; Twisting couple on a cylinder- Torsional pendulum - Rigidity modulus and moment of inertia.

Viscosity: Co-efficient of viscosity and its dimensions - Rate of flow of liquid in a capillary tube - Poiseuilles' formula - Experiment to determine co-efficient of viscosity of a liquid - Applications of viscosity.

UNIT II ULTRASONICS **9**

Classification of Sound waves ; Properties - Production of ultrasonic waves- Magnetostriction oscillator and piezoelectric oscillator ; Determination of velocity of sound in liquid using acoustic grating ; SONAR; Non destructive testing - Pulse echo system ; Industrial Applications -Welding, drilling and cutting ; Medical Applications - Sonogram.

UNIT III MODERN PHYSICS **9**

Black body radiation - Planck's theory (derivation) ; Compton effect (derivation) ; Matter waves - de-Broglie wavelength ; Wave function - Physical significance of the wave function ; Schrodinger's time independent and time dependent equations - Applications: particle in one dimensional box-degenerate and non-degenerate states.

UNIT IV APPLIED OPTICS **9**

Laser: Characteristics of laser - Stimulated absorption, spontaneous emission and stimulated emission - Population inversion ; Pumping methods ; Types of laser - Nd-YAG, CO_2 and semiconductor lasers (hetero junction) - Applications.

Optical fiber: Principle, propagation of light through optical fiber - expressions for numerical aperture and acceptance angle; Types of optical fibers; Fiber optical communication system (block diagram); Applications.

UNIT V CRYSTAL PHYSICS 9

Crystalline solids and amorphous solids; Lattice - Unit cell - Crystal system - Bravais lattices; Lattice planes - Miller indices - Derivation of inter-planar spacing in cubic lattice; Calculation of number of atoms per unit cell , atomic radius , coordination number and packing factor for SC, BCC, FCC and HCP structures ; Crystal Growth Techniques - Bridgman and Czochralski techniques.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- understand the elastic properties of the materials.
- apply the fundamental knowledge of ultrasonics in engineering and medical field.
- predict the dual nature of matter , radiation and the application of wave nature of particles .
- associate the propagation of light concept for real time applications.
- categorize the basics of crystals, its structures and different crystal growth techniques.

TEXT BOOKS

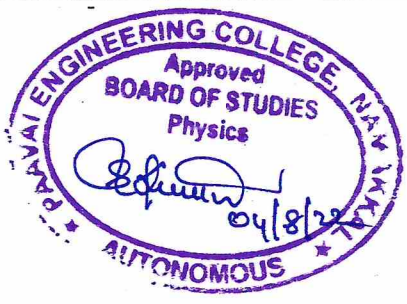
1. R.K. Gaur and Gupta. S.L, Engineering Physics, Dhanpat Rai Publishers, 2017.
2. Rajagopal, K, Engineering Physics, PHI learning Private Limited, 2015.

REFERENCE BOOKS

1. Halliday, D., Resnick, R. & Walker, J. —Principles of Physicsl. Wiley, 2020.
2. Avadhanulu M.N. & Murthy, Arun T.V.S, A Textbook of Engineering Physics, Volume-I, S.Chand and Company Limited, 2018.
3. M. Arumugam, Engineering Physics, Anuradha Publications, 2014.
4. V.Rajendran, Engineering Physics, Tata McGraw-Hill, New Delhi, 2014.
5. P K Palanisamy, Engineering Physics, 4th Edition, SciTech Publications, 2014.
6. A.Marikani, Engineering Physics, PHI, New Delhi, 2013.

CO/PO Mapping
(3/2/1 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	2	-	-	-	3	1	-	-	-	2	-	-
CO2	2	3	3	-	-	-	3	1	-	-	-	2	-	-
CO3	-	2	2	-	-	-	2	1	-	-	-	2	-	-
CO4	3	3	3	-	-	-	3	2	-	-	-	3	-	-
CO5	2	3	3	-	-	-	3	1	-	-	-	2	-	-



CH20101 **ENGINEERING CHEMISTRY** 3 0 0 3

(Common to all B.E./ B.Tech Programmes)

COURSE OBJECTIVES

To enable the students to

- make students conversant with water quality requirements and treatment methods.
- understand the need of adsorption process in surface chemistry.
- Acquire basic knowledge of phase rule and significance of alloys.
- relate appropriate laws of thermodynamics in heat transfer process.
- acquaint with the fundamentals of nanomaterials, preparation and its processing.

UNIT I WATER AND ITS TREATMENT 9

Hardness of water –types –expression of hardness –units –estimation of hardness of water by EDTA method –boiler troubles (scale and sludge, priming and foaming, caustic embrittlement and boiler corrosion) –boiler feed water –Treatments-Internal treatment (phosphate and calgon conditioning) external treatment –Ion exchange process– - desalination- Reverse Osmosis-Disinfection - Break point chlorination.

UNIT I SURFACE CHEMISTRY AND CATALYSIS 9

Adsorption: Types of adsorption –adsorption of gases on solids –adsorption of solute from solutions – adsorption isotherms –Freundlich's adsorption isotherm –Langmuir's adsorption isotherm– applications of adsorption on pollution abatement.

Catalysis: Catalyst –types of catalysis - Homogenous and Heterogeneous –autocatalysis –catalytic poisoning and catalytic promoters –enzyme catalysis–Michaelis –Menten equation.

UNIT III 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, Zn-Mg system. Alloys: Introduction – Definition – properties of Alloys- Functions –-Ferrous alloys -Nichrome and Stainless Steel- Heat treatment of steel:Non Ferrous alloys; Brass and Bronze.

UNIT IV CHEMICAL THERMODYNAMICS 9

Terminology of thermodynamics-First law- Second law: Entropy- Entropy change for a reversible and irreversible process; Free energy and work function: Helmholtz and Gibbs free energy functions- Criteria of spontaneity: Derivation of - Gibbs Helmholtz Equation -Maxwell Relations- Derivation of Vant Hoff Isotherm and Isochore.

UNIT V NANOMATERIALS 9

Basics-distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoscale materials properties and uses of nanocluster, rods, tubes (CNT) and wires. Preparation of nanoparticles-thermolysis, hydrothermal, solvothermal, Preparation of Carbon nanotube by chemical vapour deposition, laser ablation; applications of nanomaterials.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- analyze the water quality parameters and treatment methods.
- employ the concepts of surface chemistry and its application in various fields
- differentiate the various states in a equilibrium on a heterogeneous system.
- interpret the thermodynamic laws in energy calculations.
- elaborate the importance and advancements of nanomaterials.

TEXT BOOKS

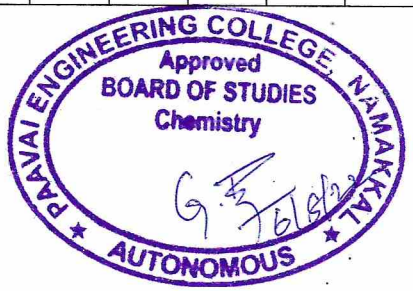
1. Jain P.C. and Jain. M., Engineering Chemistry, 17/e, 2014 DhanpatRai Publishing Company, New Delhi, Reprint 2017.
2. B.K. Sharma – "Industrial Chemistry", 11th ed., (2015), Goel Publication, Meerut.

REFERENCES

1. Puri B.R., Sharma L.R., Pathania, M.S. Principles of physical chemistry,15/e2015 ,VishalPublishing Co., Meerut, Reprint 2017.
2. Atkins, P. and de Paula, J., Atkin's Physical Chemistry, 9th ed., Oxford Univ. Press,New Delhi. 2014.
3. Dara S.S. and Umare S.S., A text book of Engineering Chemistry,12/e,2014S.Chand and Company Limited, New Delhi,Reprint 2016.
4. Engineering Chemistry, Wiley India Editorial Team, Wiley Eastern Pub, New Delhi 2018.

CO/PO Mapping
(3/2/1 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	-	-	3	2	-	-	-	-	2	-	-
CO2	1	2	2	1	-	1	-	-	-	-	-	-	-	-
CO3	2	2	3	2	-	1	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	2	-	-
CO5	1	1	2	-	2	1	-	-	-	-	-	1	-	-



EE20101 **BASIC ELECTRICAL ENGINEERING** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- analyze the various DC circuits and find the circuit parameters.
- introduce the AC fundamentals and three phase circuits.
- familiarize the various electrical machines and measuring instruments.
- study the basics of electrical wiring.
- learn the basics of electrical safety.

UNIT I DC CIRCUITS **9**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation ; Superposition, Thevenin and Norton Theorems.

UNIT II AC CIRCUITS **9**

Representation of sinusoidal waveform- peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance; Three- phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III FUNDAMENTALS OF ELECTRICAL MACHINES AND MEASURING INSTRUMENTS **9**

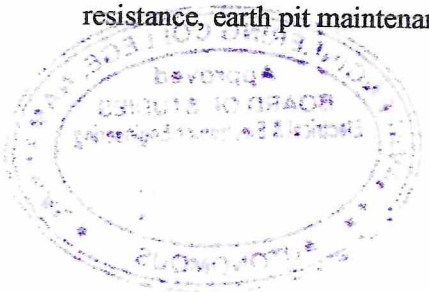
Construction, principle of operation, characteristic and application - single phase transformer, single phase induction motor, and DC Motor; Types of electrical measurement, Construction and operating principles - Moving coil and moving iron instruments (ammeters and voltmeters), dynamometer type watt meters and energy meters.

UNIT IV ELECTRICAL INSTALLATIONS AND WIRING **9**

Components of LT switchgear- Switch fuse unit (SFU), MCB, ELCB, types of wires and cables, systems of distribution of electrical energy, systems of wiring, choice of wiring systems, earthing; Batteries- Lead acid, Li-Ion.

UNIT V ELECTRICAL SAFETY PRACTICES AND STANDARDS **9**

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



TOTAL PERIODS : 45

COURSE OUTCOMES

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

- implement the basic knowledge about DC Electric circuits.
- apply the knowledge of AC fundamentals and AC circuits.
- understand the operation of electrical machines and measuring instruments and their usage
- analyze various electrical components and perform electrical wiring.
- follow the Indian electricity rules and apply in electrical installations

TEXT BOOKS

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering" , Tata McGraw Hill, 2011.
2. J.B.Gupta, "Basic Electrical Engineering", S.K.Kataria & Sons, 2015

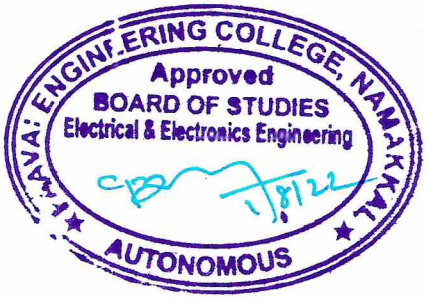
REFERENCES

1. V.K.Mehta and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S.Chand, 2014.
2. R.Muthusubramanian and S.Salivahanan, "Basic Electrical and Electronics Engineering Fundamentals", Tata McGraw Hill, 2010.
3. G.Nagarajan, " Basics of Electrical Electronics and Computer Engineering", A.R.Publications, 2001.
4. B.L.Theraja and A.K.Theraja, "Electrical Technology Volume 1", S.Chand, 2010
5. "The Electricity Rules", Universal's Law Publishing, 2011.

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

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



CS20102 PROGRAMMING IN C 3 0 0 3

(Common to CSE/IT/Cyber security)

COURSE OBJECTIVES

To enable the students to

- write C programs for solving simple computing problems using different problem-solving techniques.
- compare different control structures and array data structure.
- understand the various libraries used to manipulate string, characters and function prototypes in C language.
- learn how to allocate, free memory and to control dynamic arrays of any type of data in general and structures in particular.
- interpret structure and union which helps to organize the data structurally.

UNIT I PROBLEM SOLVING TECHNIQUES AND BASICS OF C LANGUAGE 9

Problem Solving Techniques- problem definition, problem solving steps, algorithm, flow charts, pseudo code; Overview of C-structure of C programs, constants, variables and data types, operators and expressions; managing input and output operations.

UNIT II CONTROL STATEMENTS AND ARRAYS 9

Decision Making and Branching- simple if statement, ifelse statement, nested ifelse statement, switch statement; Looping- while statement, dowhile statement ,for statement ,nested for statement; Arrays- definition, declaration-initialization, one dimensional array, two dimensional array;

UNIT III STRINGS AND FUNCTIONS 9

String- declaring and initializing string variables, reading and writing on strings, string handling functions; Functions- Function Definition, Function declaration, function prototypes; parameter passing methods- call by value, call by reference; recursion.

UNIT IV POINTERS AND DYNAMIC MEMORY ALLOCATION 9

Pointer Fundamentals- pointer declaration, passing pointers to a function, pointers and one dimensional arrays, operations on pointers, dynamic memory allocation.

UNIT V STRUCTURES, UNION AND FILE HANDLING 9

Structures and Union- defining a structure, declaring structure variables, accessing structure members, structure initialization, nested structure, array of structures; Union- definition, declaration, structure vs. union;File Handling- introduction to file— defining and opening a file, closing a file, file operations.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- implement the fundamental techniques of problem-solving using computers.
- outline data types and arrays where they will use them in simple data processing applications.
- code computer programs, analyze and interpret the concepts of strings and functions.
- implement, test and debug programs that use operations on pointers.
- associate and differentiate the usage of structure and union datatypes.

TEXT BOOKS

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

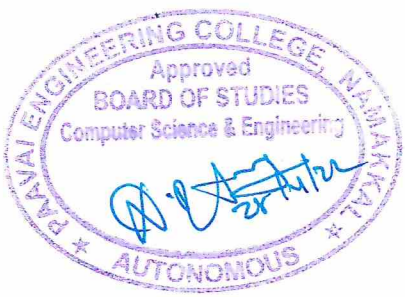
REFERENCES

1. Byron Gottfried, "Programming with C", 3rd Edition, (Indian Adapted Edition), TMH publications, 2010.
2. Stephen G.Kochan, "Programming in C", 5th Edition, Pearson Education India, (2011).
3. Brian W.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc., (2009).

CO-PO MAPPING

Course Outcome with Programme Outcomes and Programme Specific Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

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



CH20102 **CHEMISTRY LABORATORY** 0 0 2 1

COURSE OBJECTIVE.

To enable the students to

- acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- acquaint with the determination of molecular weight of a polymer.
- explain the amount of corrosion in steel by instrumentation.
- Elucidate the presence of metals in aqueous media by volumetric analysis

LIST OF EXPERIMENTS (Any 8 experiments)

1. Determination of DO content of water sample by Winkler's method.
2. Estimation of Calcium and Magnesium in water sample by a titration method.
3. Determination of strength of given hydrochloric acid by using pH meter.
4. Determination of strength of acids in a mixture using conductivity meter
5. Conductometric titration of strong acid Vs Strong base.
6. Estimation of HCl using Na_2CO_3 as primary standard and determination of alkalinity in
7. water sample.
8. Estimation of copper content of the given solution by Iodometry.
9. Estimation of iron content of the given solution using potentiometer.
10. Determination of molecular weight of polyvinyl alcohol using Oswald viscometer.
11. Corrosion experiment – weight loss method.

TOTAL PERIODS : 30

COURSE OUT COMES

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

- outfitted with hands-on experience in the quantitative analysis of water quality parameters.
- evaluate the weight loss in steel.
- calculate the molecular weight of a given polymer.
- interpret the presence of metal in aqueous medium

CO/PO Mapping
(3/2/1 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	2	2	1	-	-	-	2	-	-	-	1	2
CO2	2	3	2	2	1	-	-	-	2	-	-	-	1	2
CO3	1	2	1	2	1	-	-	-	1	-	-	-	1	1
CO4	2	1	1	1	2	-	-	-	2	-	-	-	1	2

CS20104 **PROGRAMMING IN C LABORATORY** 0 0 2 1

COURSE OBJECTIVES

To enable the students to

- write diversified solution using C language.
- trace the execution of programs using operators and control statements.
- implement programs with pointers and arrays, perform pointer arithmetic and use the preprocessor.
- write programs that perform operations using derived data types.

LIST OF EXPERIMENTS

1. Writing algorithms, flowcharts and pseudo codes for simple problems.
2. Programs on Operators.
3. Programs on Control statements.
4. Programs on one Dimensional Arrays.
5. Programs on Two Dimensional Arrays.
6. Programs on String Handling Functions.
7. Programs on Function using Call by Value, Call by reference.
8. Programs on Pointers.
9. Programs on Structures.
10. Programs on Union.

TOTAL PERIODS: 30

COURSE OUTCOMES

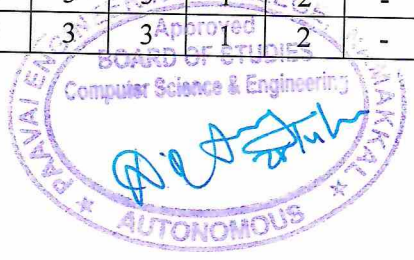
Upon the completion of the course, the students will be able to

- know concepts in problem solving.
- develop readable C programs with branching and looping statements which uses various types of operators.
- construct programs that demonstrate effective use of C features including arrays and pointers.
- code programs using data types like structure and union.

CO-PO MAPPING

Course Outcome with Programme Outcomes and Programme Specific Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

	PO's												PSO's	
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	1	1	2	1	2	3	-	1	-	-	1	1	1
CO2	2	2	3	3	1	-	-	-	2	-	-	-	1	2
CO3	1	2	1	2	2	3	3	1	2	-	-	-	1	1
CO4	2	1	1	2	2	3	3	1	2	-	-	-	1	2



EN20201 **ENGLISH COMMUNICATION SKILLS II** 3 0 0 3

(COMMON TO ALL BRANCHES)

COURSE OBJECTIVES

To enable the students to

- enhance their ability to listen, read, write and speak English.
- comprehend and draft reports related to their branches of specialization.
- augment their ability to read and comprehend technical texts.
- equip the learners to make effective presentations on topics in engineering and technology.
- Participate successfully in Group Discussions.

UNIT I 9

Language focus - One word substitutions, Active Voice and Passive Voice ; Listening to news and announcements; Reading - Developing analytical skills, Deductive and inductive reasoning; Writing - Check list, Recommendation; Speaking - Syllable, Stress, Intonation, Spot light.

UNIT II 9

Language focus - Collocations - Fixed expressions (adhere to, on the part of etc.) - Idioms and Phrases; Listening to a telephone conversation; Reading - Extensive reading, Summarizing; Writing - Writing a job application – Resume, E-mail format; Speaking – Welcome address, Vote of thanks,.

UNIT III 9

Language focus - Compound Nouns - Numerical Expression – Preposition; Listening to TED ; Reading - critical reading, Reading articles in newspapers; Writing Technical Reports - Industrial Visit report, Accident report, Feasibility report, Survey report; Speaking - impromptu talks, Introduction of the chief guest, MC.

UNIT IV 9

Language focus - Direct and Indirect Speech - If Conditionals - Purpose expression; Listening and viewing a model Group discussion; Reading - journals articles; Writing – writing review of a Book, film, product - Drafting project proposal, Letter writing – Business Correspondence - Calling for quotation, Placing orders, complaint ; Speaking -.Group Discussion skills - Initiating, turn taking and concluding the discussion. .

UNIT V 9

Language focus - Editing - Extended Definitions - Silent Letters; Listening to speech by technologists; Reading - English Corner; Writing – Process description, Product description, Writing SOP, Essay writing; Speaking - Interview Techniques, mock interviews.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- converse with clarity and confidence.
- interpret and analyse a given text.
- draft comprehensive reports, job applications and e-mails.
- make effective presentations using power point.
- participate successfully in group discussions and interviews.

TEXT BOOK

1. N P Sudharshana, C.Savitha. English Technical Communication. Cambridge University Press India Pvt.Ltd, New Delhi.2016.
2. Mahalakshmi.S.N. English and Workbook for Engineers. V.K. Publications, Sivakasi. 2017.

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

MA20201 COMPLEX VARIABLES AND DIFFERENTIAL EQUATIONS 3 1 0 4

(COMMON TO ALL BRANCHES)

OBJECTIVES

To enable the students to

- gain knowledge on differentiation and integration of vector-valued functions
- understand the differential calculus of complex variables and analytic functions
- recognize the concept of complex integration applied in engineering disciplines
- develop analytical techniques to solve various higher order differential equations with constant and variable coefficients
- study Laplace Transforms of various standard functions, periodic functions and understand the techniques of solving ordinary differential equations using Laplace Transform methods.

UNIT I VECTOR CALCULUS **12**

Gradient, Divergence and Curl, Directional derivative; Irrotational and solenoidal vector fields; Vector integration - Green's, Gauss divergence and Stokes' theorem, Statement, Verification and Simple applications.

UNIT II ANALYTIC FUNCTIONS **12**

Functions of a complex variable; Analytic functions - Statement of Cauchy-Riemann equations; Harmonic functions and orthogonal properties, Harmonic conjugate, Construction of analytic functions; Conformal mapping - w= z+c, cz, 1/z and Bilinear transformation.

UNIT III COMPLEX INTEGRATION **12**

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 - evaluation of circular and semicircular Contour.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS **12**

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 V LAPLACE TRANSFORM **12**

Laplace transform - Transform of elementary functions, Properties; Transform of periodic functions; Definition of Inverse Laplace transforms - Statement and applications of Convolution theorem; Initial and Final value theorems; Solution of linear ODE of second order with constant coefficients by Laplace transforms.

TOTAL PERIODS: 60

COURSE OUTCOMES

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

- familiarize with vector calculus concepts
- gain knowledge on the analytic functions and related concepts
- solve real definite integrals with the help of complex integration techniques
- solve higher order differential equations with constant and variable coefficients
- determine Laplace transforms of various functions and solve initial value problems using Laplace transforms.

TEXT BOOKS

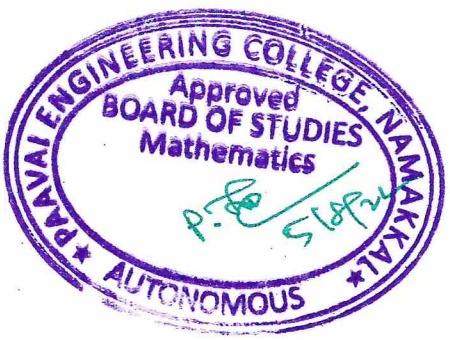
1. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi,(2011).
2. Dr. P. Jayakumar, and Dr. B. Kishokkumar, "Differential Equations and Complex Analysis", Global Publishers, Chennai.,(2015).
3. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th Edition, Wiley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

REFERENCE BOOKS

1. Dass, H.K., and Er. Rajnish Verma, "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	Programmes Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO2	3	2	3	2	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	2	-	-
CO4	3	2	3	3	-	-	-	-	-	-	-	3	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	3	-	-



PH20202 **PHYSICS FOR INFORMATION SCIENCE** 3 0 0 3

(COMMON TO CSE & IT, IOT,AI&ML)

COURSE OBJECTIVES

To enable the students to

- gain knowledge about the conduction properties of metals.
- correlate better understanding the carrier concentration and its variations with temperature in an intrinsic semiconductor.
- learn the optical properties of materials and its uses.
- introduce the different types of magnetic materials and its applications.
- familiarize the quantum mechanical behavior of materials and its device applications.

UNIT I CONDUCTING MATERIALS 9

Conductors - Types of conducting materials ; Classical free electron theory of metals – Postulates; Derivation of electrical conductivity and thermal conductivity - Wiedemann-Franz law and its verifications - Lorentz number - Merits and demerits of classical free electron theory ; Quantum free electron theory - Fermi-Dirac distribution function - Effect of temperature on Fermi function ; Density of energy states-Carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS 9

Types of semiconductors - elemental and compound semiconductor ; Intrinsic semiconductor: Expressions for density of electrons, holes and carrier concentration - Fermi level -Variation of Fermi level with temperature ; Electrical conductivity - Band gap determination ; Extrinsic semiconductors: n-type and p-type semiconductors (Qualitative) ; Hall effect - Determination of Hall coefficient - Applications.

UNIT III MAGNETIC MATERIALS 9

Types of magnetic materials - dia, para, ferro, antiferro and ferri magnetic materials ; Domain theory of ferromagnetism ; Hysteresis ; Soft and hard magnetic materials ; Ferrites – Applications ; Spintronics and devices -Giant magneto resistance, Tunnel magneto resistance and Colossal magneto resistance-Magneto recording and storage devices.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials- Absorption of light in metals, insulators and semiconductors; LED-Organic LED; LCD: properties -Twisted neamatic display -Dynamic scattering display-Comparison between LED and LCD; Photoconductive and photovoltaic materials: LDR and Solar cell.

UNIT V NANO DEVICES 9

Electron density in bulk material - Size dependence of Fermi energy ; Quantum confinement - Quantum structures - Density of states in quantum well, quantum wire and quantum dot structure(qualitative) ; Band gap of nanomaterials ;Tunneling: single electron phenomena and single electron transistor ; Quantum dot laser.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- select the metals required for specific applications in the field of engineering and technology.
- discuss the basic idea of doping and determinations of Hall co-efficient.
- apply the knowledge of magnetic properties of materials and its applications in data storage.
- understand the properties of optical materials for optoelectronic devices.
- relate the different types of quantum structures and nanodevices

TEXT BOOKS

1. A.Marikani, Material Science, PHI, New Delhi, 2017.
2. Md Nazoor Khan, S. Panigrahi, Principles of Engineering Physics 2, Cambridge University Press,2017.

REFERENCE BOOKS

1. Umesh K Mishra & Jasprit Singh, Semiconductor Device Physics and Design, Springer,2008.
2. Hanson, G.W. "Fundamentals of Nanoelectronics". Pearson Education, 2009.
3. P K Palanisamy, Material Science, SciTech Publications, 2015
4. Kasap, S.O. -Principles of Electronic Materials and Devices, McGraw-Hill Education, 2017.
5. S.O.Pillai, Solid State Physics. New Academic Science, Publishers, 2018.
6. Charles Kittel, Paul McEuen, Introduction to Solid State Physics, John Wiley & Sons, Limited, 2018.

CO/PO Mapping (3/2/1 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	2	-	-	2	3	2	-	-	-	3	-	-
CO2	2	3	1	-	-	2	3	2	-	-	-	2	-	-
CO3	2	3	2	-	-	2	3	1	-	-	-	2	-	-
CO4	2	3	3	-	-	2	3	2	-	-	-	3	-	-
CO5	2	2	2	-	-	2	3	1	-	-	-	2	-	-

CS20202

DATA STRUCTURES

3 0 0 3

(Common to CSE/IT/Cyber Security)

COURSE OBJECTIVES

To enable the students to

- implement the basic concept of linked list ADT.
- analyze the behavior of data structures such as stacks, queues.
- summarize the basic tree concepts and its types
- understand and analyze various hashing techniques and set ADT.
- apply various graph structures using C.

UNIT I INTRODUCTION AND LINKED LIST

9

Introduction to data structures- definition, need of data structures, types of data structures; abstract data types (ADT)- list ADT, operations(insertion, deletion, merge and traversal),an-ay based implementation, linked list implementation, singly linked list, doubly linked list, circularly linked list ; Applications of linked list-polynomial ADT.

UNIT II LINEAR DATA STRUCTURES — STACK

9

Stack ADT-definition of stack, operations on stack, array based implementations; linked list implementations applications of stack- infix to prefix conversion, infix to postfix conversion, postfix expression evaluation, recursion implementation.

UNIT III LINEAR DATA STRUCTURES — QUEUE

9

Queue ADT- definition of queue, operations on queue, array based implementations, linked implementations -circular queue; priority queue- insert operation, remove operation; Applications of Queue.

UNIT IV NON LINEAR DATA STRUCTURES-TREES

9

Tree ADT- basic tree terminologies, binary tree, types of binary trees, expression tree, tree traversal; Binary Search Tree ADT- construction, searching, insertion, deletion; AVL trees-rotation, insertion, deletion; Applications of Trees.

UNIT V NON LINEAR DATA STRUCTURES —GRAPHS

9

Graphs- definition-types of graphs, basic terminologies, representations of graph, topological sort ;Graph Traversals- breadth first search, depth first search; Shortest Path Algorithms- unweighted shortest path, Dijkstra's algorithm; Minimum Spanning Trees-prim's algorithm, kruskal's algorithm; Applications of Graphs

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- implement list ADT for linear data structures.
- design programs using a variety of data structures such as stacks, queues.
- analyze and implement various tree structures.
- analyze and implement graph shortest path algorithms.
- implement list ADT for linear data structures.

TEXT BOOKS

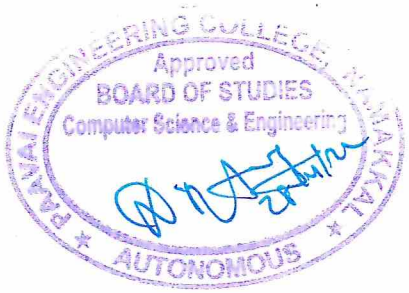
1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Fourth Edition, Pearson Education, 2013.
2. V. Aho, J. E. Hoperoft, and J. D. Ullman, 'Data Structures and Algorithms', Pearson Education, 2009.

REFERENCES

1. Reema Theraja, "Data Structures Using C", Second Edition, Oxford University Press, 2011.
2. R. F. Gilberg, B. A. Forouzan, 'Data Structures', Second Edition, Thomson IndiaEdition, 2008.
3. M. Tenenbaum, Y. Langsam, and M. J. Augenstein, 'Data Structures using C',Pearson Education, 2007.

CO-PO MAPPING

Course Outcome with Programme Outcomes and Programme Specific Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	3	1	2	-	1	3	3	-	2	-	3	1	-
CO2	1	2	1	2	-	1	2	3	-	2	-	3	1	-
CO3	1	2	1	2	-	1	2	3	-	2	-	3	1	2
CO4	1	3	1	2	-	1	3	3	-	2	-	2	1	1
CO5	1	3	1	2	-	1	3	3	-	2	-	2	1	-



ME20201 **ENGINEERING GRAPHICS** 2 1 0 3

(Common to All Branches)

COURSE OBJECTIVES

To enable the students to

- familiarize concepts like dimensioning, conventions and standards related to Engineering drawing and imbibe knowledge on plane curves and projection of points
- understand on projection of lines and plane surfaces
- develop the visualization skills for understanding the projection of solids
- illustrate on sectioning of solids and development of surfaces for simple solids
- comprehend the orthographic projection and isometric view

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 PROJECTION OF POINTS 8

Basic Geometrical constructions, Curves used in Engineering Practices: Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method – Construction of cycloid – Construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Introduction to Orthographic projection - Projection of points in four quadrants.

UNIT II PROJECTION OF LINES AND PLANES 9

Projection of straight lines (only First angle projections) inclined to both the HP & VP -Determination of true lengths and true inclinations by Change of Position method. Projection of Planes (Square, Pentagon, Hexagon and Circle) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 8

Projection of simple solids like Square Prism, Pentagonal Prism, Hexagonal Prism, Square Pyramid, Pentagonal Pyramid, Hexagonal Pyramid, Cylinder and Cone when the axis is inclined to one of the principal planes (either horizontal or vertical plane).

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 9

Sectioning of Prisms (Square, Pentagon, Hexagon) and Pyramids (Square, Pentagon, Hexagon), cylinder and cone in simple vertical position when the cutting plane is inclined to one of the principal planes (HP & VP) and perpendicular to the other – obtaining true shape of section; Development of lateral surfaces of simple and sectioned solids mentioned above.

UNIT V ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS 9

Representation of Three-dimensional objects –Need for importance of multiple views and their placement – First angle projection -- layout views -developing visualization skills through multiple views from pictorial views of objects; Principles of isometric projection – isometric scale –Isometric projections of simple solids

and truncated solids -Prisms, pyramids, cylinders, cones - Conversion of Isometric view to orthographic projection.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- draw the basic curves and projection of points in four quadrants
- delineate the projections of straight lines and plane surfaces in given quadrant
- comprehend the projection of solids in various positions in first quadrant
- generate the sectioning of solids and development of surfaces
- interpret orthographic and isometric projection of simple solids

TEXT BOOKS

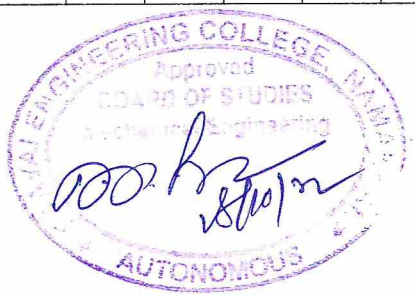
1. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
2. Prabhakaran.S, Makesh.M, Subburam.V, "Engineering Graphics", Maruthi Publishers, Chennai, 2018.

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. N.D.Bhatt., "Engineering Drawing", Charotar Publishing House Pvt Ltd, Fifty third edition, 2014.

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	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	2	1	-	-	-	2	-	2	3	2
CO2	3	2	3	-	2	1	-	-	-	2	-	2	3	2
CO3	3	2	3	-	2	1	-	-	-	2	-	2	3	2
CO4	3	2	3	-	2	1	-	-	-	2	-	2	3	2
CO5	3	2	3	-	3	1	-	-	-	2	-	2	3	2



MC20201 **ENVIRONMENTAL SCIENCE AND ENGINEERING** 3 0 0 0

(Common to all B.E./ B.Tech Programmes)

(Mandatory, Noncredit Course)

COURSE OBJECTIVES

To enable the students to

- recognize the interdisciplinary and holistic nature of the environment.
- create awareness on ecosystem and biodiversity preserve.
- study about the integrated themes of pollution control and waste management.
- understand the significance of natural resources and environment to stimulate sustainable development.
- assess the socio-economic, political and ethical issues on population with environment.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Environment: Definition- scope - importance – need for public awareness. Forest resources: Use –over exploitation deforestation - effects on forests and tribal people. Water resources: Use – over utilization of-surface and ground water. Mineral resources Use – exploitation- environmental effects of extracting and using mineral resources – Food resources: effects of modern agriculture- fertilizer-pesticide problems. Role of an individual in conservation of natural resources. Activity: Slogan making event on conserving natural resources or plantation of trees.

UNIT II ECOSYSTEMS AND BIODIVERSITY 9

Concept of an ecosystem: Structure and function of an ecosystem – producers - consumers –decomposers– energy flow in the ecosystem – ecological succession – food chains - food webs and ecological pyramids. Ecosystems- Types of ecosystem: Introduction - forest ecosystem –aquatic ecosystems(lakes, rivers). Biodiversity: Introduction– definition (genetic - species –ecosystem). Diversity- Value of biodiversity: Consumptive use - productive use – social values – ethical values-aesthetic values- Hotspots of biodiversity-Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity

UNIT III POLLUTION 9

Pollution: Définition –air pollution - water pollution - marine pollution - noise pollution - thermal pollution. Solid waste management: Causes - effects - control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Disaster management Floods – earthquake - cyclone - landslides. Electronic waste -Sources-Causes and its effects.

UNIT IV SOCIAL ISSUES AND ENVIRONMENT 9

Water conservation - rain water harvesting - watershed management. Environmental ethics:– climate change- global warming and its effects on flora and fauna - acid rain - ozone layer depletion - nuclear accidents- nuclear holocaust - Environment protection act: Air (Prevention and Control of Pollution)-act water (Prevention and control of Pollution) act .

UNIT V HUMAN POPULATION AND ENVIRONMENT 9

Human population: Population growth - variation among nations – population explosion – family welfare programme– environment and human health – Human rights – value education – HIV/AIDS– women and child welfare. Role of information technology in environment and human health.

TOTAL PERIODS : 45

COURSE OUTCOMES

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

- the importance of interdisciplinary nature of environment studies, uses and exploitation of

GE20201 ENGINEERING PRACTICES LABORATORY 0 0 4 2

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 in household 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 joining components.
  - Demonstration of plumbing requirements of high-rise buildings.

CARPENTRY USING POWER TOOLS ONLY

- Study of the joints in roofs, doors, windows and furniture.
- Hands-on-exercise:
  - Wood work, joints by sawing, planning and cutting.

II. MECHANICAL ENGINEERING PRACTICE

WELDING

- Preparation of arc welding of Butt joints, Lap joints and Tee-joints

BASIC MACHINING

- Simple Turning, Facing
- Drilling Practice

SHEET METAL WORK

- Model making – Trays, Funnels, etc.
- Different type of joints.

FITTING

- Vee – Fitting models

DEMONSTRATION

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

TOTAL PERIODS: 30

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, ponder and power factor in RLC Circuit.
4. Measurement of energy using single phase energy meter.
5. Earthing practices and measurement of earth resistance using megger.
6. Study of electrical equipment's such as iron box, induction heater.

IV ELECTRONICS ENGINEERING PRACTICE

1. Study of electronic components and equipments— Resistor, color coding measurement of AC signal parameter (Peak-Peak, RMS, Period, and Frequency) using CRO.
2. Study of logic gates AND, OR, Ex-OR and NOT.
3. Generation of clock signal.
4. Soldering practice — Components devices and circuits, using general purpose PCB.
5. Measurement of ripple factor of HWR.
6. Construction and verification of half adder circuit.
7. Construction and verification of half subtractor circuit.
8. Study of telephone, F.M radio and cell phone.

TOTAL PERIODS: 30

COURSE OUTCOMES

At the end of this course, the 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	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	2	1	2	2	3	2
CO2	3	1	-	-	-	-	-	-	2	1	2	2	3	2
CO3	3	1	-	-	-	-	-	-	2	1	2	2	3	2
CO4	3	1	-	-	-	-	-	-	2	1	2	2	3	2

PAVAI ENGINEERING COLLEGE APPROVED BOARD OF STUDIES Electronics & Communication Engineering AUTONOMOUS

PAVAI ENGINEERING COLLEGE, NAMAKKAL Approved BOARD OF STUDIES Electrical & Electronics Engineering AUTONOMOUS

CS20204 **DATA STRUCTURES LABORATORY** **0 0 2 1**

(Common to CSE/IT/Cyber Security)

COURSE OBJECTIVES

To enable the students to

- develop skills to design and analyze simple linear data structures.
- solve problem using linked list and tree traversal.
- develop AVL for various operation.
- strengthen the ability to identify and apply the suitable data structure for the given real world problem.

LIST OF EXPERIMENTS

1. Implementation of Singly Linked list and its operations.
2. Implementation of doubly Linked list and its operations.
3. Implementation of Stack and its operation.
4. Implementation of Queue and its operation.
5. Implementation of polynomial addition using Linked list.
6. Implementation of Tree Traversal (inorder-preorder-post order).
7. Implementation of binary search tree and its operation.
8. Implementation of AVL Trees insertion, deletion Operations.
9. Implementation of Shortest path algorithm.
10. Implementation of Graph Traversals.

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- write well-structured procedure-oriented programs.
- analyze run-time execution of previous learned stack, queue, and linked list.
- compare the tree traversal methods.
- describe the AVL tree shortest path and traversal algorithm.

CO-PO MAPPING

Course Outcome with Programme Outcomes and Programme Specific Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	2	2	3	2	-	-	2	1	2	2	3	2
CO2	2	3	2	2	3	2	-	-	2	1	2	2	3	2
CO3	2	3	2	2	3	2	-	-	2	1	2	2	3	2
CO4	2	3	2	2	3	2	-	-	2	1	2	2	3	2