

**PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018**

**(AUTONOMOUS)**

**REGULATIONS 2019**

**(CHOICE BASED CREDIT SYSTEM)**

**B.E – COMPUTER SCIENCE AND ENGINEERING**

**CURRICULUM**

**(Applicable to the candidates admitted during the academic year 2020-2021 onwards)**

**SEMESTER I**

S.No.	Category	Course Code	Course Title	L	T	P	C
<b>Theory</b>							
1.	HS	EN20101	English Communication Skills I	3	0	0	3
2.	BS	MA20101	Matrices and Calculus	3	1	0	4
3.	BS	PH20101	Engineering Physics	3	0	0	3
4.	BS	CH20101	Engineering Chemistry	3	0	0	3
5.	ES	EE20101	Basic Electrical Engineering	3	0	0	3
6.	ES	CS20102	Programming in C	3	0	0	3
<b>Practical</b>							
7.	BS	CH20102	Chemistry Laboratory	0	0	2	1
8.	ES	CS20104	Programming in C Laboratory	0	0	2	1
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>4</b>	<b>21</b>

**SEMESTER II**

S.No.	Category	Course Code	Course Title	L	T	P	C
<b>Theory</b>							
1.	HS	GE20202	Heritage of Tamils	1	0	0	1
2.	HS	EN20201	English Communication Skills II	3	0	0	3
3.	BS	MA20201	Complex Variables and Differential Equations	3	1	0	4
4.	BS	PH20202	Physics for Information Science	3	0	0	3
5.	ES	ME20201	Engineering Graphics	2	1	0	3
6.	PC	CS20202	Data Structures	3	0	0	3
7.	MC	MC20201	Environmental Science and Engineering	3	0	0	0
<b>Practical</b>							
8.	BS	PH20205	Physics Laboratory	0	0	2	1
9.	ES	GE20201	Engineering Practices Laboratory	0	0	4	2
10.	PC	CS20204	Data Structures Laboratory	0	0	2	1
<b>TOTAL</b>				<b>18</b>	<b>2</b>	<b>8</b>	<b>21</b>

CSE

EN20101

ENGLISH COMMUNICATION SKILLS I  
(COMMON TO ALL BRANCHES)

3 0 0 3

**COURSE OBJECTIVES**

To enable 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 written English.
- communicate appropriately and present on different topics.
- write minutes, essays and letters without errors.

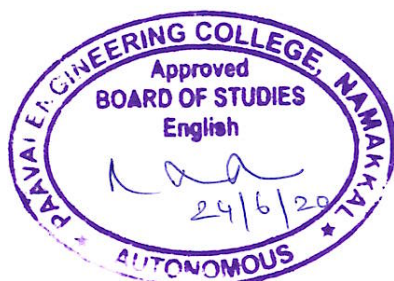
**TEXT BOOKS**

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

**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.

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





## (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 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.

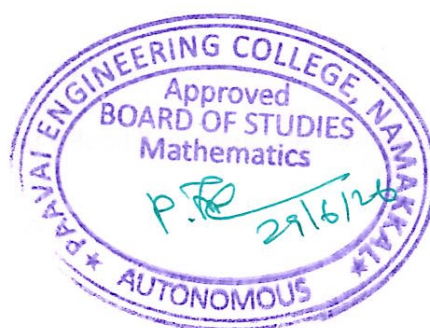
#### TEXT BOOKS

1. Grewal. B.S, “Higher Engineering Mathematics”, 41<sup>st</sup> 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”, 3<sup>rd</sup> Edition, Tata McGraw Hill, (2011).

#### REFERENCE BOOKS

1. James Stewart, “Calculus “, 8<sup>th</sup> Edition, Cengage Learning, USA 2015 reprint.
2. Erwin Kreyszig., “Advanced Engineering Mathematics” 10<sup>th</sup> 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”, 3<sup>rd</sup> Edition, Pearson Education,(2012).
5. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2008).

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3	2	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3	2	3







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.

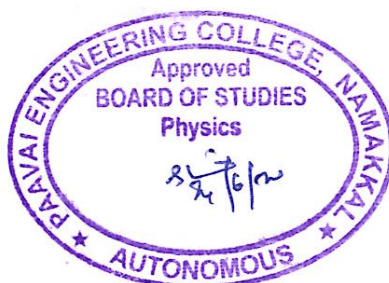
### TEXT BOOKS

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 Physics. 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, 4<sup>th</sup> 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	-	-





(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–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 II 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.

## REFERENCE BOOKS

1. Puri B.R., Sharma L.R., Pathania, M.S. Principles of physical chemistry, 15/e/2015 ,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	-	-





**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

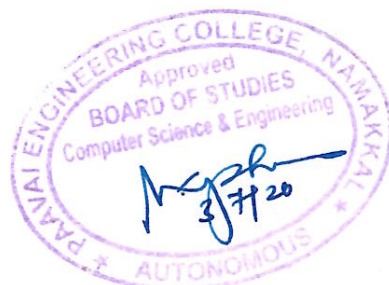
1. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.

## 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	-	-



**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

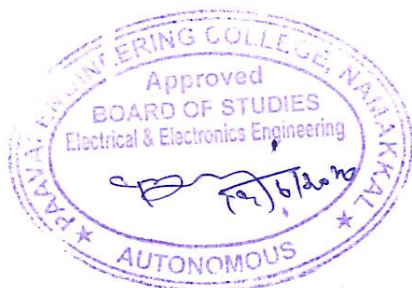
1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering" , Tata McGraw Hill, 2011.
2. J.B.Gupta, "Basic Electrical Engineering", S.K.Kataria & Sons, 2015

## 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														
CO's	PO's												PSO'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





CH20102

**CHEMISTRY LABORATORY**  
(Common to all B.E./ B.Tech Programmes)

0 0 2 1

**COURSE OBJECTIVES**

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 Eight Experiments)**

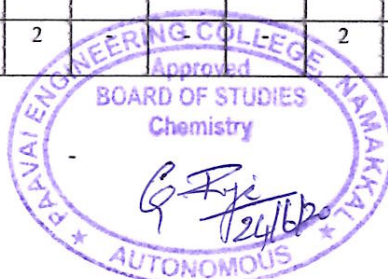
1. Determination of DO content of water sample by Winkler's method.
2. Determination of Calcium and Magnesium in water sample by a titration method.
3. Determination of strength of given hydrochloric acid by using pH meter.
4. Determination of strength of acids in a mixture using conductivity meter.
5. Conductometric titration of strong acid Vs Strong base.
6. Estimation of HCl using  $\text{Na}_2\text{CO}_3$  as primary standard and determination of alkalinity in water sample.
7. Estimation of copper content of the given solution by Iodometry
8. Estimation of iron content of the given solution using potentiometer.
9. Determination of molecular weight of polyvinyl alcohol using Oswald viscometer.
10. Corrosion experiment – weight loss method.

**TOTAL PERIODS: 30****COURSE OUTCOMES**

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 metals in aqueous media

<b>CO/PO Mapping</b> (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



**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 datatypes.

**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														
CO's	PO's												PSO'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

**CH20102****CHEMISTRY LABORATORY****0 0 2 1****COURSE OBJECTIVES**

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**

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

**TOTAL PERIODS: 30****COURSE OUTCOMES**

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

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

**CO-PO MAPPING**

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



## அலகு I

## மொழி மற்றும் இலக்கியம்

3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி- தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள் தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

## அலகு II

## மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை

3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

## அலகு III

## நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்

3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியன் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

## அலகு IV

## தமிழர்களின் திணைக் கோட்பாடுகள்

3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அறம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

## அலகு V

## இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத்

3

## தமிழர்களின் பங்களிப்பு

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்கள் அச்சு வரலாறு.

TOTAL PERIODS: 15

## TEXT CUM REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை. (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் ( விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருளை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print).
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by International institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subramanian, Dr.K.D.Thirunavukkarasu)
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by International institute of Tamil Studies)
9. Keeladi – ‘Sangam City Civilization on the banks of river vaigai’ (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by the author)
11. Porunai Civilization (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).
12. Journey of Civilization Indus to vaigai (R.Balakrishnan) (Published by RMRL) – Reference Book

**GE20202**

**HERITAGE OF TAMILS**

**L P T C**  
**1 0 0 1**

**UNIT I LANGUAGE AND LITERATURE 3**

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

**UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – 3**  
**SCULPTURE**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

**UNIT III FOLK AND MARTIAL ARTS 3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

**UNIT IV THINAI CONCEPT OF TAMILS 3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

**UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL 3**  
**MOVEMENT AND INDIAN CULTURE**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

**TOTAL PERIODS: 15**



## TEXT CUM REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை. (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் ( விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print).
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by International institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subramanian, Dr.K.D.Thirunavukkarasu)
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by International institute of Tamil Studies)
9. Keeladi – ‘Sangam City Civilization on the banks of river vaigai’ (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by the author)
11. Porunai Civilization (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).
12. Journey of Civilization Indus to vaigai (R.Balakrishnan) (Published by RMRL) – Reference Book

EN20201

**ENGLISH COMMUNICATION SKILLS II  
(COMMON TO ALL BRANCHES)**

3 0 0 3

**COURSE OBJECTIVES**

To enable 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, Recommendations; 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 Talks ; 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 BOOKS

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

## 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.

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







## 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.

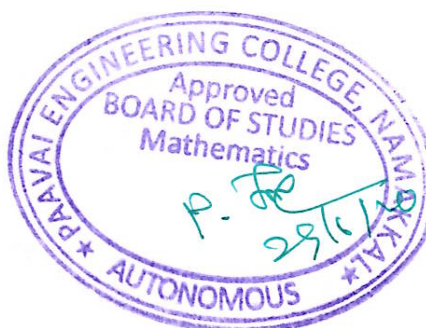
## TEXT BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", 41<sup>st</sup> 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" 10<sup>th</sup> 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", 3<sup>rd</sup> Edition, Tata McGraw Hill, 2011.
3. Peter V. O'Neil, "Advanced Engineering Mathematics", 7<sup>th</sup> Edition, Cengage learning, (2012).
4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, (2008).

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	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





**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

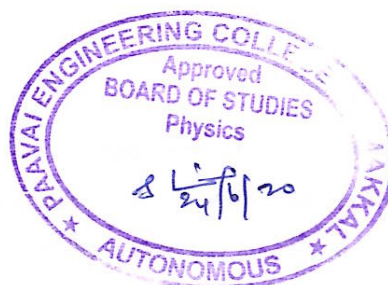
## TEXT BOOKS

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	-	-



CSE

ME20201

**ENGINEERING GRAPHICS  
(COMMON TO ALL BRANCHES)**

2 1 0 3

**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, students 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	PO 10	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





**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),array 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

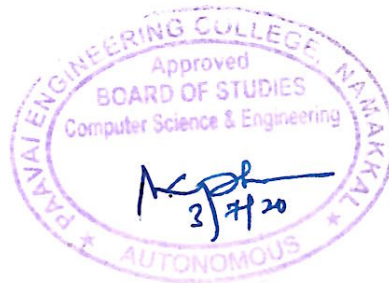
1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Fourth Edition, Pearson Education, 2013.
2. V. Aho, J. E. Hopcroft, and J. D. Ullman, 'Data Structures and Algorithms', Pearson Education, 2009.

## 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 India Edition, 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	-



MC20201 ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 0  
 (Common to all B.E./ B.Tech Programmes)  
 (Mandatory, Non credit 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–Definition, 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

- explain the importance of interdisciplinary nature of environment studies, uses and exploitation of natural resources.
- analyze the different types of ecosystem and biodiversity, its values and protecting the environment from degradation.
- investigate the existing environmental challenges related to pollution and its management.
- select suitable strategies for sustainable management of components of environment.
- correlate the impacts of population and human activities on environment.

### TEXT BOOKS

1. Raman Sivakumar, Introduction to Environmental Science and Engineering, 2<sup>nd</sup>Edn, Tata McGraw Hill Education Private Limited, New Delhi,(2010).
2. Benny Joseph, “Environmental Science and Engineering”, Tata McGraw Hill, (2010).

### REFERENCES

1. S. Divan, Environmental Law and Policy in India, Oxford University Press, New Delhi, 2001.
2. A.K.De, Environmental Chemistry, VI edition,2015 NewAge International (P) ltd Publication, New Delhi.
3. C.S.Rao, Environmental Pollution and Control engineering, Vedition, New Age International (P) ltd Publication, NewDelhi 110002
4. Clair Nathan Sawyer, Perry L. McCarty, Gene F. Parkin, “Chemistry for Environmental Engineering

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



(COMMON TO AERO/AGRI/BM/CHEM/CIVIL/CSE/CYBER  
SECURITY/EEE/MCT/MECH/ME/PHARMA)**COURSE OBJECTIVES**

To enable the students to

- study the maximum stress applied to the given beam by uniform and non-uniform bending method.
- learn the concept of moment of inertia and rigidity modulus using torsional pendulum.
- demonstrate various experiments and physics concepts applied in viscosity of liquid, sound, light, thermal physics and semiconductor.
- understand the use of Bragg's Law and its relation to crystal structure.

**LIST OF EXPERIMENTS (Any seven)**

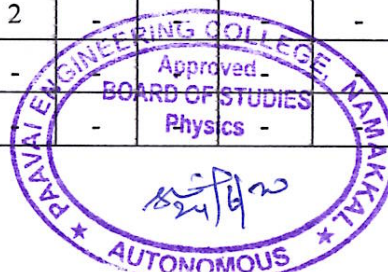
1. Determination of Young's modulus by non- uniform bending method.
2. Determination of Young's modulus by uniform bending method.
3. Determination of rigidity modulus - Torsion pendulum.
4. Determination of coefficient of viscosity of a liquid -Poiseuille's method.
5. Determination of velocity of sound and compressibility of liquid - Ultrasonic interferometer.
6. Determination of particle size using Laser.
7. Determination of acceptance angle in an optical fiber.
8. Determination of lattice parameters using powder XRD (Interpretation and data analysis).
9. Determination of band gap of a semiconductor.
10. Determination of thermal conductivity of a bad conductor - Lee's Disc method.

**TOTAL PERIODS: 30****COURSE OUTCOMES**

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

- determine the Young's modulus and rigidity modulus of the given material.
- calculate the coefficient of viscosity of a liquid and determine the velocity of ultrasonic waves, compressibility of the given liquid.
- determine the particle size in the given powder (Lycopodium), the characteristics of a given optical fibre, the thermal conductivity of a given bad conductor and band gap of a semiconductor.
- interpret the crystallographic structure, chemical composition of materials.

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





CSE

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. (e) Demonstration of plumbing requirements of high-rise buildings.

##### CARPENTRY USING POWER TOOLS ONLY

- c) Study of the joints in roofs, doors, windows and furniture.
- d) 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, power 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**

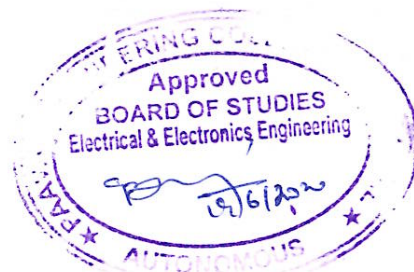
1. Study of electronic components and equipment's– Resistor, color coding measurement of AC signal parameter (Peak-Peak, RMS, Period, and Frequency) using CRO.
2. Study of logic gates AND, OR, Ex-OR and NOT.
3. Generation of clock signal.
4. Soldering practice – Components devices and circuits, using 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.



**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.

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