SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur, Chengalpattu Dt.-603203, Tamil Nadu.

(Approved by AICTE, Affiliated to Anna University
'A' Grade Accredited by NAAC, NBA Accredited, ISO 9001: 2015 Certified)

CURRICULA AND SYLLABI

B.E - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATION 2023

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to Anna University, Chennai)

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS – 2023

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

1. To prepare students to succeed in employment/profession and/or to pursue post graduate and research educations in Electronics and Communication Engineering discipline in particular and allied engineering disciplines in general.

2. To provide students with a solid foundation in mathematical, Scientific and engineering fundamentals required to formulate, analyze and solve engineering problems requiring knowledge of Electronics and Communication Engineering.

3. To prepare students with engineering breadth to innovate, design, develop electronics products and to contribute in providing solutions related to multidisciplinary real life problems.

4. To inculcate in students professional and ethical attitude, effective communication skills and teamwork to become a successful professional.

5. To provide students with an academic environment that makes them aware of excellence and life-long learning in emerging technologies.

2. PROGRAMME OUTCOMES (POs):

After going through the four years of study, our Electronics and Communication Engineering Graduates will exhibit ability to:

PO#	Graduate Attribute	Programme Outcome
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation for the solution of complex engineering problems.
2	Problem analysis	Identify, formulate, research literature, and analyse complex engineering problems reachingsubstantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3	Design/development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities, with an understanding of the limitations.
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management andfinance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological Change.

3. PROGRAM SPECIFIC OUTCOMES (PSOs):

By the completion of Electronics and Communication Engineering program the student will have following Program specific outcomes

1. Ability to apply the acquired knowledge of basic skills, mathematical foundations, principles of electronics, modeling and design of electronicsbased systems in solving engineering Problems.
2. Ability to understand and analyze the interdisciplinary problems for developing innovative sustained solutions with environmental concerns.
3. Ability to update knowledge continuously in the tools like MATLAB, NS2, XILINIX and technologies like VLSI, Embedded, Wireless Communications to meet the industry requirements.
4. Ability to manage effectively as part of a team with professional behavior and ethics.

4. PEO / PO Mapping:

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	1	2	3	4	5	6	7	8	9	10	11	12
I	3	3	3	4	2	-	-	-	2	1	2	3
II	3	3	2	2	2	2	-	-	-	-	-	3
III	3	3	3	3	2	-	-	3	-	-	-	2
IV	-	-	-	-	2	2	2	2	-	-	-	-
V	3	2	3	3	3	-	-	-	2	2	-	3

Contribution: 1 - Reasonable 2 - Significant 3 – Strong

MAPPING – UG - ELECTRONICS AND COMMUNICATION ENGINEERING

			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
Year I	Sem I	EN3111- Professional English – I	2	3	2	2	2	-	2	-	-	3	1	1	-	-	-	-
		MA3122 - Matrices And Calculus	3	2	2	1	-	-	-	-	-	-	-	1	-	-	-	-
		PH3123 - Engineering Physics	3	1	1	1	1	1	1	-	-	-	-	1	-	-	-	-
		CH3124 - Engineering Chemistry	3	2	2	2	1	1	2	-	-	-	-	2	-	1	-	-
		GE3132 - Basic Electrical and Instrumentation Engineering	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-
		GE3111 - தமிழர் மரபு / Heritage of Tamils																
		EN3119 - English Language Learning Laboratory	2	1	1	1	2	-	2	-	-	3	-	1	-	-	-	-
		GE3121 - Physics and Chemistry Laboratory	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
		GE3134 - Engineering Practices Laboratory	3	2	2	2	2	1	-	-	1	-	1	1	2	2	3	2
Year I	Sem II	EN3211 - Professional English – II	2	2	1	2	2	-	2	-	-	3	1	1	-	-	-	-
		MA3222 - Statistics and Numerical Methods	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
		PH3233 - Physics for Electronics Engineering	3	2	2	1	2	2	3	-	-	-	-	1	-	-	-	-
		CH3223 - Chemistry of Electronic Materials	3	2	2	2	2	1	1	-	-	-	-	2	2	-	-	-
		GE3231 - Problem Solving and Python Programming	2	3	3	3	2	-	-	-	-	-	2	2	2	-	2	1
		GE3211 – தமிழரும் தொழில்நுட்பமும் / Tamils and Technology																
		GE3221 - Engineering Sciences Laboratory	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
		GE3232 - Problem Solving And Python Programming Laboratory	2	3	3	3	2	-	-	-	-	-	2	2	1	3	2	2
		GE3233 - Engineering Graphics And Design	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
		GE3251 - NSS / YRC / NSO / Club Activities**#**																

			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
Year II	Sem III	MA3321 - Transforms and Partial Differential Equations	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
		EC3362 - Solid State Circuits	3	3	3	3	2	2	-	-	-	-	-	1	2	1	1	3
		EC3363 - Signals and Systems	3	3	3	3	3	2	-	-	-	-	-	3	2	3	1	-
		EE3363 - Electric Circuit Analysis	1	1	1	2	2	-	-	3	-	-	3	2	1	1	2	3
		EC3365 - Electromagnetic Fields	3	2	1	2	-	-	-	1	-	1	-	2	2	1	2	-
		EC3366 - Digital Systems Design	2	3	3	2	2	2	-	-	2	2	2	2	2	2	2	2
		EC3367 - Electronics Circuits Design Laboratory	3	3	2	3	2	2	2	2	3	3	2	2	3	2	2	2
		EE3369 - Circuit Theory and Electronic Devices Laboratory	3	3	2	2	3	-	-	1	2	-	2	2	2	2	-	2
Year II	Sem IV	MA3424 - Applied Mathematics for Electronics and Communication Engineering	3	3	3	2	1	-	-	-	-	-	1	1	1	-	-	-
		EC3462 - Linear Integrated Circuits	3	2	3	2	3	2	-	-	-	-	1	1	2	1	1	1
		EC3463 - Communication Systems	2	2	2	2	-	1	-	-	-	-	2	3	2	2	2	2
		EC3464 - Microprocessors, Microcontrollers And Interfacing	2	1	2	2	3	1	-	2	-	-	3	2	2	1	3	2
		EI3464 - Control Systems	3	3	1	2	-	-	-	3	-	3	-	1	1	-	-	2
		GE3451 - NCC Credit Course Level - I																
		EC3465 - Digital Signal Processing	3	3	3	3	-	-	-	-	2	-	-	-	3	2	3	2
		EC3466 - Linear IC and PCB Design Laboratory	3	2	2	2	2	1	-	-	2	3	3	2	3	2	1	1
		EC3467 - Microprocessors, Microcontrollers and Interfacing Laboratory	2	2	3	2	3	2	2	2	2	2	-	2	2	2	3	3

Contribution: 1 - Reasonable 2 - Significant 3 – Strong

SRM VALLIAMMAI ENGINEEERING COLLEGE, CHENNAI
(AN AUTONOMOUS INSTITUTION)
REGULATION-2023
CHOICE BASED CREDIT SYSTEM
B.E – ELECTRONICS AND COMMUNICATION ENGINEERRING
CURRICULUM FOR SEMESTER I TO IV

Semester - I

SI.No	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
		THEORY						
1.	EN3111	Professional English - I	HSMC	3	3	0	0	3
2.	MA3122	Matrices and Calculus	BSC	4	3	1	0	4
3.	PH3123	Engineering Physics	BSC	3	3	0	0	3
4.	CH3124	Engineering Chemistry	BSC	3	3	0	0	3
5.	GE3132	Basic Electrical and Instrumentation Engineering	ESC	3	3	0	0	3
6.	GE3111	தமிழர் மரபு / Heritage of Tamils	HSMC	1	1	0	0	1
		PRACTICAL						
7.	EN3119	English Language Learning Laboratory	EEC	2	0	0	2	1
8.	GE3121	Physics and Chemistry Laboratory	BSC	4	0	0	4	2
9.	GE3134	Engineering Practices Laboratory	ESC	4	0	0	4	2
		TOTAL		27	16	1	10	22

Semester - II

SI.No	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
		THEORY						
1.	EN3211	Professional English - II	HSMC	3	3	0	0	3
2.	MA3222	Statistics and Numerical Methods	BSC	4	3	1	0	4
3.	PH3223	Physics for Electronics Engineering	BSC	3	3	0	0	3
4.	CH3223	Chemistry of Electronic Materials	BSC	3	3	0	0	3
5.	GE3231	Problem solving and Python Programming	ESC	3	3	0	0	3
6.	GE3211	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSMC	1	1	0	0	1
		THEORY CUM PRACTICAL						
7.	GE3233	Engineering Graphics and Design	ESC	5	1	0	4	3
		PRACTICAL						
8.	GE3221	Engineering Sciences Laboratory	BSC	4	0	0	4	2
9.	GE3232	Problem solving and Python Programming Laboratory	ESC	4	0	0	4	2
10.	GE3251	NSS / YRC / NSO / Club Activities#	PCD	0	0	0	0	0
		TOTAL		30	17	1	12	24

 # Conducted after college hours

Semester - III

Sl.No	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA3321	Transforms and Partial Differential Equations	BSC	3	3	0	0	3
2.	EC3362	Solid State Circuits	PCC	3	3	0	0	3
3.	EC3363	Signals and Systems	PCC	3	3	0	0	3
4.	EE3363	Electric Circuit Analysis	PCC	3	3	0	0	3
5.	EC3365	Electromagnetic Fields	PCC	3	3	0	0	3
THEORY CUM PRACTICAL								
6.	EC3366	Digital Systems Design	PCC	5	3	0	2	4
PRACTICAL								
7.	EC3367	Electronics Circuits Design Laboratory	PCC	3	0	0	3	1.5
8.	EE3369	Circuits Theory and Electronic Devices Laboratory	PCC	3	0	0	3	1.5
		TOTAL		26	18	0	8	22

Semester - IV

Sl.No	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA3424	Applied Mathematics for Electronics and Communication Engineering	BSC	2	2	0	0	2
2.	EC3462	Linear Integrated Circuits	PCC	3	3	0	0	3
3.	EC3463	Communication Systems	PCC	3	3	0	0	3
4.	EC3464	Microprocessors, Microcontrollers and Interfacing	PCC	3	3	0	0	3
5.	EI3464	Control Systems	PCC	3	3	0	0	3
6.	GE3451	NCC Credit Course Level – I*		3*	3*	0	0	3*
THEORY CUM PRACTICAL								
7.	EC3465	Digital Signal Processing	PCC	5	3	0	2	4
PRACTICAL								
8.	EC3466	Linear IC and PCB Design Laboratory	PCC	3	0	0	3	1.5
9.	EC3467	Microprocessors, Microcontrollers and Interfacing Laboratory	PCC	3	0	0	3	1.5
		TOTAL		25	17	0	8	21

NCC Credit Course level –I is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SUMMARY

S.No	Subject Area	Credits Per Semester								Total Credits
	Name of the Programme : B.E. Electronics and Communication Engineering									
		I	II	III	IV	V	VI	VII	VIII	
1	HSMC	4	4					2		10
2	BSC	14	10	3	2	2	2			33
3	ESC	3	10							13
4	PCC			19	19	16	10.5	8.5		73
5	PEC					6	6	6		18
6	OEC							3		3
7	EEC	1					3	1	10	15
8	Non-Credit / (Mandatory)						0	0		
	Total	22	24	22	21	24	21.5	20.5	10	165

EN3111 **PROFESSIONAL ENGLISH – I** **L T P C**
3 0 0 3

OBJECTIVES:

- To upgrade the English language skills of students by introducing communication techniques, speaking and grammar learning activities which are relevant to authentic contexts.
- To improve the basic reading and writing skills of the learners.
- To enhance the communicative competence of the first-year engineering students.
- To enable learners to use language effectively in academic/work contexts.
- To help learners understand content- context in relevant situations.

UNIT – I: INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION   9

Listening: Podcast watching – Listening for new words and pronunciation.

Speaking: Note of appreciation for classmates /family member – formal appreciation of someone, expression of feelings.

Reading: Books, shorts stories to be read. Filling forms (i.e.) post office or bank.

Writing: Film and series Review / Book Review, Email and Informal letters.

Language and Vocabulary development: WH questions, Yes/No questions, Single Word Substitutes, Pronouns, Parts of Speech, Question tags, Prefixes and Suffixes.

UNIT – II: NARRATION AND SUMMATION   9

Listening: Books – Short Stories to be read aloud in class for listening purpose.

Speaking: Short stories to be read and narrated in the class.

Reading: Reading favourite blogs on Travel, Sports and Food and expressing opinions regarding the same.

Writing: Paragraph writing, Report – field trip / I.V., Autobiography and Comprehension.

Language and Vocabulary development: Tenses – Past, Antonyms, Synonyms, Subject Verb agreement and Prepositions.

UNIT – III: DESCRIPTION OF A PROCESS/PRODUCT   9

Listening: Listening to snippets from celebrities/ National leaders' lives.

Speaking: Narrating personal experiences/ events – Expression of emotions and feelings.

Reading: Reading short biographies – famous people and description of the same.

Writing: Instruction, Product / Process description and Advertisements (classified advertisement and display advertisement)

Language and Vocabulary development: Adjectives- Degrees of Comparison, Tenses – Present, Compound Nouns, Homonyms, Homophones and Discourse markers – connective and sequence words

UNIT – IV: CLASSIFICATION AND INTERPRETATION   9

Listening: Listening to Ted Talks.

Speaking: Recreating a Ted talk session in the class.

Reading: Newspaper Reading (Editorial) and understanding.

Writing: Note making, Blogging, Interpretation of charts and graphs.

Language and Vocabulary development: Articles, Collocations and Phrasal Verbs.

UNIT – V: EXPRESSION OF THOUGHTS AND IDEAS   9

Listening: Listening to audio books and answering questions.

Speaking: Presentation on a non-technical topic.

Reading: Editorials from newspaper.

Writing: Essay writing – Descriptive and Narrative essays.

Language and Vocabulary development: Tenses – future, Negative statements and questions, Punctuations, Cause and Effect, Content and Function words.

TOTAL: 45 PERIODS

COURSE OUTCOMES

On completion of the course, student will be able to

CO1: To strengthen the basics of grammar.

CO2: To narrate informal and informal situations.

CO3: To describe a process/product and express opinion.

CO4: To interpret and analyse the content/information given.

CO5: To write short essays, personal letters and emails in English.

TEXT BOOKS:

1. English for Science and Technology Cambridge University Press,2021. Dr.Veena Selvam, Dr.Sujatha Priyadarshini, Dr. Deep Mary Francis, Dr.K.N.Shoba and Dr.Lourdes Joevani, Department of English, Anna University.

2. Technical Communication – Principles and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, 2016, New Delhi.

REFERENCES:

1. Effective Communication Skill, Kulbhusan Kumar, R.S.Salaria, Khanna Publishing House.

2. Wings of Fire - An Autobiography by A.P.J Abdul Kalam with Arun Tiwari, Sangam Books Ltd , Edition: 50, 1999

3. World's Most Popular Short Stories Saki Maupassant, Anton Chekhov, O Henry Paperback

4. Professional Speaking skills, Aruna Koneru, Oxford University Press.

5. English For Engineers and Technologists, Orient Blackswan Private Ltd. Department of English,Anna University,2020.

CO - PO and CO - PSO MAPPING

Course Outcomes	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	2	2	2	-	-	-	-	3	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	3	1	1	-	-	-	-
CO3	2	-	2	2	-	-	-	-	-	3	-	1	-	-	-	-
CO4	3	3	-	2	-	-	2	-	-	3	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Avg	2	3	2	2	2	-	2	-	-	3	1	1	-	-	-	-

MA3122   **MATRICES AND CALCULUS**   **L T P C**
                                                            3 1 0 4

OBJECTIVES:

- To understand and apply matrix techniques for engineering applications.
- To familiarize the student with basic calculus and traditions of traditional calculus.
- To solve the problems in single and multivariable calculus and plays an important role in science, economics, engineering.
- Vector calculus can be widely used for modeling the various laws of physics.
- To familiarize the student with multiple integrals and their usage in find the area and volume of two and three dimensional objects.

UNIT-I: MATRICES   9L+3T

Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigen vectors - Statement and Applications of Cayley-Hamilton Theorem - Reduction of a quadratic form into canonical form by orthogonal transformation.

UNIT-II: DIFFERENTIAL CALCULUS OF ONE VARIABLE   9L+3T

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Rolle's Theorem and Mean Value theorem -Taylor's series- Maxima and Minima of functions of one variable.

UNIT-III: DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES   9L+3T

Partial derivatives - Total derivatives - Jacobians and properties - Taylor's series for functions of two variables - Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers.

UNIT-IV: MULTIPLE INTEGRALS   9L+3T

Double integrals in Cartesian and polar coordinates - Change of order of integration - Area enclosed by plane curves - Change of variables in Polar coordinates - Triple integrals - Volume of solids.

UNIT-V: VECTOR CALCULUS   9L+3T

Gradient and directional derivative – Divergence and curl – Vector identities – Irrotational and Solenoidal vector fields – Vector Integration Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

                                        TOTAL: 45L +15T PERIODS

OUTCOMES:

To apply the idea of reducing complex problems into simple form using matrix technique.

Basic application of calculus in engineering problems and to tackle for different geometries.

This course equips the students to have basic knowledge and understanding the Partial derivatives and maxima and minima by Lagrange's method.

Basic application of Double and Triple integrals used in Engineering real life problems

To study the vector differentiation and vector integration by using standard theorems.

TEXT BOOKS:

1. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi, 2011.3. Gupta S.C and Kapoor V.K, "Fundamentals of Mathematical Statistics", S.Chand Private Ltd.,11th Edition, 2005.

2. Veerarajan.T, "Engineering Mathematics", McGrawHill Education(India) Private Ltd 2019.

REFERENCE BOOKS:

1. Bali N.P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt. Ltd., 2011.

2. James Stewart, " Calculus : Early Transcendentals ", Cengage Learning, 8th Edition, New Delhi, 2015.

3. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics", Volume I, Second Edition, Pearson Publishing, 2017.

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

Course Outcomes	PROGRAM OUTCOMES												Program Specific			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO	3	2	2	1	-	-	-	-	-	-	-	1	-	-	-	-
CO	3	2	2	1	-	-	-		-	-	-	1	-	-	-	-
CO	3	2	2	1	-	-	-		-	-	-	1	-	-	-	-
CO	3	2	2	1	-	-	-		-	-	-	1	-	-	-	-
CO	3	2	2	1	-	-	-		-	-	-	1	-	-	-	-
Avg	3	2	2	1	-	-	-	-	-	-	-	1	-	-	-	-

No Correlation -   Low 1   Medium 2   High 3

PH3123   **ENGINEERING PHYSICS**   **L   T   P   C**

(Common to all Branches of B.E./B.Tech. Programmes)   **3   0   0   3**

OBJECTIVES:

- To enhance the fundamental knowledge in crystalline materials and its applications.
- To explore the knowledge in the production of ultrasonic waves and application in the engineering field.
- To familiarize the basics of laser and their technical advances in scientific, industrial and health care areas.
- To understand the principle of fibre optical fibre and its applications.
- To explore basic concept of quantum and dual nature of particle.

UNIT-I: PROPERTIES OF MATERIALS   9

Elasticity - Hooke's law - Stress-strain and its uses - Poisson ratio - factors affecting elastic modulus and tensile strength.

Single crystalline, polycrystalline and amorphous materials - unit cell - space lattice - crystal systems - Bravais lattice - Miller indices - d-spacing - characteristics of unit cell - SC, BCC, FCC and HCP structure - - thermal and mechanical properties of materials - crystal growth techniques - Czochralski and Bridgmann.

UNIT-II: ULTRASONICS   9

Introduction - Properties - Production: **Magnetostriction method** and **Piezoelectric method -** Acoustical grating - **determination of ultrasonic velocity in liquid - Application:** Detection of flaw in materials (Non Destructive Testing) - ultrasonic soldering, welding - SONAR - diagnostic sonography - cars' air bag sensor-dispersion of fog - Probe sonication for 2D material formation.

UNIT-III: LASERS AND ITS APPLICATIONS   9

Basic concepts and characteristics - Einstein's A and B coefficients (derivation) - population inversion - Pumping methods - Nd-YAG laser - CO_2 laser - Semiconductor lasers: homo junction and heterojunction - applications: laser welding, laser cutting, laser cooling, pattern formation by laser etching, laser bar code scanner - LIDAR – Laser tissue interaction, laser surgery - Holography - NLO - electro-optic effect.

UNIT-IV: FIBRE OPTICS   9

Structure and principle - Propagation of light through optical fibre - acceptance angle, numerical aperture - fractional index change - Types of optical fibres (material, mode and refractive index) - Attenuation: absorption, scattering and bending - Dispersion - Fibre optic communication system (Block diagram) and advantages over conventional methods - fibre optic sensors: pressure and displacement- Endoscope.

UNIT-V: QUANTUM PHYSICS   9

Black body radiation and energy distribution spectrum - Planck's theory of radiation - matter waves - de-Broglie wavelength in terms of energy, voltage and temperature - Electron diffraction - G.P.Thomson experiment - wave function and its physical significance - Schrödinger's wave equation - time independent and time dependent equations - Particle in a one-dimensional box- Normalization of wave function - Quantum Tunnelling - Scanning Tunnelling Microscope.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the students should be able
1. To understand the properties of materials, crystalline material and growth techniques.
2. To understand the basics, generation and application of ultrasonics.
3. To acquire knowledge on the concepts of lasers and their applications in industry and medical field.
4. To conversant on principle behind the fibres and their applications in communication and devices made out of optical fibre.
5. To get knowledge on advanced physics concepts of quantum theory and its applications.

TEXT BOOKS:

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.

2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.

3. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.

4. Brijlal and Subramanyam, "Properties of Matter", S .Chand publishing, 2002.

5. M.N.Avadhanulu & P.G.Kshirasagar, "A Text Book of Engineering Physics" – IX Edition, S.Chand Publications, 2014.

6.V.Rajendiran, Engineering Physics, Tata McGraw-Hill, New Delhi. 2011.

REFERENCE BOOKS:

1. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.

2. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.

3. Shatendra Sharma & Jyotsna Sharma, "Engineering Physics". Pearson, 2018.

CO - PO and CO - PSO MAPPING

Course Outcomes	PROGRAM OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	1	1	-	-	1	1	-	-	-	-	1	-	-	-	-
2	3	1	1	1	2	1	1	-	-	-		1	-	-	-	-
3	3	2	2	1	1	1	1	-	-	-	-	1	-	-	-	-
4	3	2	2	1	1	1	1	-	-	-	-	1	-	-	-	-
5	2	1	1	1	1	1	1	-	-	-	-	1	-	-	-	-
Avg	3	1	1	1	1	1	1	-	-	-	-	1	-	-	-	-

1 - low, 2 – medium, 3 – high, '-' – no correlation

CH3124   **ENGINEERING CHEMISTRY**   **L T P C**
                    (First Semester-Common to all branches)   **3 0 0 3**

OBJECTIVES

To make the students familiar with boiler feed water requirements, related problems and domestic water treatment techniques.

To introduce the basic concepts and applications of chemical thermodynamics.

To acquaint the student with the principles of chemical kinetics and its applications towards engineering.

To make the student conversant with the basics of surface chemistry and catalysis.

To inculcate the students with the basics principles and preparatory methods of nanomaterials.

UNIT I   **WATER TECHNOLOGY**   **9**

Introduction-sources of water-impurities present in water-hard water and hardness - types, Municipal water treatment: primary treatment and disinfection - Desalination of brackish water: Reverse Osmosis, Boiler troubles: scale and sludge, caustic embrittlement, boiler corrosion priming and foaming, Treatment of boiler feed water - Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning). External treatment: Ion exchange process, cooling waters (Langelier index).

UNIT II   **CHEMICAL THERMODYNAMICS**   **9**

Introduction-terminology of thermodynamics, the first law of thermodynamics: enthalpy, second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions: Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions, Criteria of spontaneity; Gibbs-Helmholtz equation, Clausius-Clapeyron equation, Maxwell relations, Van't Hoff isotherm and isochore.

UNIT III   **CHEMICAL KINETICS**   **9**

Introduction-factors influencing the rate of reaction, order and molecularity of a reaction, kinetic equations of different orders (first, second and third order) - determination of the order of a reaction, the temperature dependence of reaction rates, unimolecular reactions, photochemical reactions and chain reactions, Theories of reaction rates, lasers in chemistry, fast reactions.

UNIT IV   **SURFACE CHEMISTRY AND CATALYSIS**   **9**

Adsorption: classification - adsorption of gases on solids - adsorption from solutions - adsorption isotherms - applications of adsorption - Freundlich's adsorption isotherm - Langmuir's adsorption isotherm, B.E.T isotherm. Catalysis: introduction - types of

catalysis - criteria - autocatalysis - catalytic poisoning and catalytic promoters - acid - base catalysis - enzyme catalysis - Michaelis - Menten equation.

UNIT V   NANOCHEMISTRY   9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties; Types of nanomaterials: Definition, properties and uses of - nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electrospinning. Applications of nanomaterials in medicine, agriculture, food science and energy resources.

Total Periods: 45

OUTCOMES

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

1. To infer the quality of water from quality parameter data and propose suitable treatment.
2. To apply the knowledge of chemical thermodynamics for material design and aspects
3. To recommend the proper chemical kinetics for engineering processes and applications.
4. To recognize the surface morphology and its engineering applications.
5. To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.

TEXTBOOKS

1. Payal B. Joshi and Shashank Deep, "Engineering Chemistry", Oxford University Press, New Delhi, 2019.
2. Shikha Agarwal, "Engineering Chemistry"-Fundamentals and Applications, 2nd Edition, Cambridge University Press, New Delhi, 2019.
3. P. C. Jain and Monica Jain, "Engineering Chemistry", 18th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2021.

REFERENCES

1. R. V. Gadag and A. Nithyananda Shetty, "Engineering Chemistry", 3rd Edition, Wiley & I.K. International (P), LTD, New Delhi, 2019.
2. S.S. Dara and S.S. Umare, "A Text Book of Engineering Chemistry", 12th Edition, S. Chand & Company LTD, New Delhi, 2018.
3. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Publishing Company LTD, 2023.
4. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.

Course Outcomes	PROGRAM OUTCOMES												Program Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	3	2	-	1	3	-	-	-	-	2	-	1	-	-
CO2	3	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	2	1	-	1	-	-	-	-	2	-	1	-	-
AVG	3	2	2	2	1	1	2	-	-	-	-	2	-	1	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

GE3132 BASIC ELECTRICAL AND INSTRUMENTATION ENGINEERING L T P C

                                                                          3 0 0 3

COURSE OBJECTIVES:

- To understand the operation of AC circuits, and basics of power system and protection schemes
- To explore the knowledge in types, construction and working of transformers
- To impart knowledge in types, construction and working of DC machines
- To impart knowledge in types, construction and working of AC machines
- To introduce the functional elements and working of measuring instruments

UNIT I   AC CIRCUITS AND POWER SYSTEMS   9

Three phase power supply – Star connection – Delta connection – Balanced and Unbalanced Loads- Power equation – Star Delta Conversion – Three Phase Power Measurement - Transmission & Distribution of electrical energy – Over head Vs Underground system – Protection of power system – types of tariff – power factor improvement

UNIT II   TRANSFORMER   9

Introduction - Ideal Transformer – Accounting For Finite Permeability And Core Loss – Circuit Model Of Transformer – Per Unit System – Determination Of Parameters of Circuit Model Of Transformer – Voltage Regulation – Name Plate Rating – Efficiency – Three Phase Transformers - Auto Transformers

UNIT III   DC MACHINES   9

Introduction – Constructional Features– Motoring and generation principle - Emf And Torque equation – Circuit Model – Methods of Excitation and magnetisation characteristics – Starting and Speed Control – Universal Motor

UNIT IV   AC MACHINES   9

Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit, Single phase Induction motors -Construction– Types–starting and speed control methods. Alternator- working principle–Equation of induced EMF – Voltage regulation, Synchronous motorsworking principle-starting methods -– Torqueequation – Stepper Motors – Brushless DC Motors

UNIT V   MEASUREMENT AND INSTRUMENTATION   9

Type of Electrical and electronic instruments – Classification- Types of indicating Instruments – Principles of Electrical Instruments –Multimeters, Oscilloscopes-Static and Dynamic Characteristics of Measurement – Errors in Measurement – Transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect and Mechanical

                                                          TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Understanding the concept of AC circuits, and basics of power system and protection schemes
- Comprehend the concepts in transformers
- Analyze the output characterizes of DC electrical machines.
- Analyze the output characterizes of AC electrical machines.
- Choose appropriate measuring instruments for given application

TEXT BOOKS:

1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education(India) Private Limited, Third Reprint, 2016.

2. Giorgio Rizzoni, "Principles and Applications of Electrical Engineering", McGrawHill Education(India) Private Limited, 2010.

3. K.Bhattacharya "Basic Electrical and Electronics Engineering", Pearson, India,2011

REFERENCE BOOKS:

1. Del Toro ,"Electrical Engineering Fundamentals", Pearson Education, New Delhi,2015.

2. Leonard S Bobrow, " Foundations of Electrical Engineering", Oxford UniversityPress, 2013

3. Rajendra Prasad ,"Fundamentals of Electrical engineering", Prentice Hall of India,2006.

4. Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Edition, 24th reprint 2016

5. A.E.Fitzgerald, David E Higginbotham and Arvin Grabel, "Basic Electrical Engineering", McGraw Hill Education(India) Private Limited, 2009

COs	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOME			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-
CO2	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-
CO3	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-
CO4	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-
CO5	2	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-
Avg	2	1	1					1								

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 கருத்துகள்- 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 – சிற்பக்**
                  கலை   **3**

நடுகல் முதல் நவீன சிற்பங்கள் வரை –ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள் , பொம்மைகள்- தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள்

அலகு III   **நாட்டுபுறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**   **3**

நாட்டுப்புற கதைகள், பாடல்கள்-தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து- ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம்- வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்

அலகு IV   **தமிழர்களின் திணைக் கோட்பாடுகள்**   **3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள்- தமிழர்கள் போற்றிய அறக்கோட்பாடு –தமிழ் சங்கம்-சங்கம் வளர்த்த தமிழ்-சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும்- சங்ககால நகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி

அலகு V   **இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத்**
                  தமிழர்களின் பங்களிப்பு   **3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு இந்தியா மற்றும் வெளிநாட்டின் பிற பகுதிகளின் தமிழ்ப் பண்பாட்டின் தாக்கம்- சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு- கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு

Total Periods: 15 hours

TEXT CUM REFERENCES:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – 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.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & 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) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

GE3111   **HERITAGE OF TAMILS**   **L T P 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 – SCULPTURE   3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making -Massive Terracotta sculptures, Village deities.

UNIT III   FOLK AND MARTIAL ARTS   3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, 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 –Tamil Sangam- 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 MOVEMENT AND INDIAN CULTURE   3

Contributionof 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 TamilBooks.

                                                        Total Periods: 15 hours

TEXT CUM REFERENCES:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – 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.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & 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) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

EN3119   ENGLISH LANGUAGE LEARNING LABORATORY   L T P C

                                                               0 0 2 1

COURSE OBJECTIVE:

The course aims to

        Enhance the employability and career skills of students.

        Orient the students towards grooming as a professional.

        Make them industry ready.

        Develop their confidence and help them attend interviews successfully.

        Help students to interact confidently in a professional scenario.

UNIT I :   PRONUNCIATION   6

Tone- Pronunciation – Intonation- Reading Aloud and Addressing- Syllable- Rhythm- Accent- Wrongly Pronounced words -Poetry Reading.

UNIT II :   NON VERBAL COMMUNICATION   6

Non Verbal Communication - Facial expressions- Eye contact - Subtle (and not so subtle) gestures -Tone of voice – Touch- Posture -Personal space.

UNIT III :   SELF INTRODUCTION AND PRESENTATION   6

Self-Introduction- Introducing oneself to the audience- Introducing the Topic – answering questions – Individual Presentation Practice – Presenting Visuals effectively - 5 Minute Presentations.

UNIT *IV :   BASICS OF SOFT SKILLS   6

Recognizing differences between groups and teams – managing time – networking professionally – Respecting social protocols- understanding career management – Developing a long - term career plan- making career changes.

UNIT V :   GROUP DISCUSSION   6

Introduction to Group Discussion – Participating in Group discussions – Understanding group dynamics – Brainstorming the Topic – Questioning and Clarifying – GD Strategies – activities to improve GD Skills.

                                         TOTAL: 30 PERIODS

COURSE OUTCOME:

On completion of the course, student will be able to

CO1: Pronounce the words correctly.

CO2: Understand the nonverbal clues.

CO3: Make an effective presentation.

CO4: Adequate soft skills required for the workplace.

CO5: Participate confidently in Group Discussions.

REFERENCES:

1. Professional Communication by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, 2014.
2. Soft Skills by S. Hariharan , N. Soundarajaran and S.P. Shanmugapriya MJP Publishers, Edition: 2013
3. Soft Skills for Everyone by Butterfield , Jeff, Cengage Learning India Pvt. Ltd.,2015. New Delhi.

CO - PO and CO - PSO MAPPING

Course Outcomes	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	-	-	-	1	-	-	-	-	-	3	-	1	-	-	-	-
CO2	1	1	-	-	-	-	1	-	-	2	-	1	-	-	-	-
CO3	2	2	1	2	2	-	-	-	-	3	-	1	-	-	-	-
CO4	2	1	1	-	-	-	3	-	-	3	-	1	-	-	-	-
CO5	-	1	-	1	-	-	-	-	-	3	-	1	-	-	-	-
Avg	2	1	1	1	2	-	2	-	-	3	-	1	-	-	-	-

PHYSICS AND CHEMISTRY LABORATORY
(Common to all branches of B.E. / B.Tech
Programmes)

L	T	P	C
0	0	4	2

OBJECTIVES:

* To learn the proper use of various kinds of physics laboratory equipment.
* To learn how data can be collected, presented and interpreted in a clear and concise manner.
* To learn problem solving skills related to physics principles and interpretation of experimental data.
* To determine error in experimental measurements and techniques used to minimize such error.
* To make the student as an active participant in each part of all lab exercises

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

1. Calculation of lattice cell parameter – X-ray diffraction method.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
3. (a). Compact disc- Determination of width of the groove using Laser.

   (b). Determination of particle size using Laser
4. (a) Determination of wavelength using Laser

   (b) Determination of acceptance angle and numerical aperture in an optical fiber.
5. Determination of Planck's constant using LED.
6. Determination of thickness of a thin wire – Air wedge method
7. Determination of wavelength of mercury spectrum – spectrometer grating
8. Determination of rigidity modulus – Torsion pendulum
9. Determination of Young's modulus by non-uniform bending method.

OUTCOMES:

At the end of the course, the students should be able
1. Understand the functioning of various physics laboratory equipment.
2. Use graphical models to analyze laboratory data.
3. Use mathematical models as a medium for quantitative reasoning and describing physical reality.
4. Access, process and analyze scientific information.
5. Solve problems individually and collaboratively.

REFERENCES

1. Wilson J.D. and Hernaandez Hall C.A.,— Physics Laboratory Experiments, Houghton Mifflin Company, New York, 2005.

2. S. Srinivasan, A Text Book of Practical Physics, S. Sultan Chand publications. 2005

3. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

CO - PO and CO - PSO MAPPING

Course Outcomes	PROGRAM OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
2	3	3	2	1	1	-	-	-	-	-		-	-	-		-
3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
Avg	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-

1 - low, 2 – medium, 3 – high, '-' – no correlation

GE3121   **PHYSICS AND CHEMISTRY LABORATORY**

(First Semester- Common to all branches)

CHEMISTRY LABORATORY: (Any five experiments to be conducted)   **L T P C**

                                                     0 0 2 1

OBJECTIVES

To inculcate experimental skills to test basic understanding of water quality parameters, such as acidity, alkalinity, hardness, DO, TDS, chloride, and chlorine.

To familiarise the students with electroanalytical techniques like conductometry and flame photometry to determine the impurities in aqueous solution.

To find the various characteristics of domestic water.

To understand the Pseudo first-order kinetics reaction.

To make the students know the synthesis of nanoparticles.

1. Determination of chloride content of water sample by Argentometric method.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard.
5. Determination of types and amount of alkalinity in water samples.
6. Estimation of available chlorine in bleaching powder solution.
7. Conductometric titration of barium chloride against sodium sulfate (Precipitation titration).
8. Estimation of sodium /potassium present in water using a flame photometer.
9. Estimation of TDS of a water sample by gravimetry.
10. Preparation of nanoparticles (Ag/Au/TiO_2/ZnO/CuO).
11. Pseudo first-order kinetics- ester hydrolysis.

                                                             TOTAL: 30 PERIODS

OUTCOMES

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

1. To infer the quality of water samples for alkalinity, hardness, DO, TDS, chloride, and chlorine.
2. To apply the knowledge on the estimation of metal ions, acidity and its precipitation nature towards their process.
3. To recognize the threshold limit for various characteristics of domestic water.
4. To identify the simple method of synthesis of nanoparticles.
5. To understand the pseudo first-order kinetics reaction from ester hydrolysis.

TEXTBOOKS

1. Vogel's Textbook of Quantitative Chemical Analysis (8th Edition, 2014).
2. Suchi Tiwari, Engineering Chemistry Lab Manual, Scitech Publications (India) Pvt. Ltd. (2nd Edition, 2013).
3. Pushpendra Kumar, Laboratory Manual for Engineering Chemistry, Reyansh Authortopic Pvt. Ltd., (1st Edition, 2022).

Course Outcomes	PROGRAM OUTCOMES												Program Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	1	1	1	1	-	1	-	-	-	-	-	-	-	-	-
CO2	2	1	1	1	1	-	-	-	-	-	-	-	-	2	-	-
CO3	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	1	1	1	2	-	-	-	-	-	-	1	-	-	-	-
CO5	2	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-
AVG	2	1	1	1	1	-	1	-	-	-	-	1	-	2	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

GE3134   **ENGINEERING PRACTICES LABORATORY**   L   T   P   C
                  (Common to all branches of B.E. / B.Tech. Programmes)   **0   0   4   2**

COURSE OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
- To provide hands on training for fabrication of components using carpentry, sheet metal and welding equipment / tools
- To gain the skills for making fitting joints and assembling air conditioner
- To develop the skills for making simple electrical wiring connections using suitable tools
- To provide hands on experience for soldering and gain knowledge about the behavior of electronics components.

GROUPA(CIVIL&MECHANICAL)

I   CIVIL ENGINEERING PRACTICE   15

Buildings:

a) Study of plumbing and carpentry components of residential and industrial buildings safety aspects.

Plumbing Works:

a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
b) Study of pipe connections requirements for pumps and turbines.
c) Preparation of plumbing line sketches for water supply and sewage works.
d) 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 works:

a) Study of the joints in roofs, doors, windows and furniture.
b) Hands-on-exercise:

   Wood work, joints by sawing, planning and cutting.

II   MECHANICAL ENGINEERING PRACTICE   15

Welding:

a)   Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding. b)   Gas welding practice - Study

Basic Machining:

a) Facing

b) Simple Turning

c) Step Turning

Sheet Metal Work:

a) Forming & Bending

b) Model making – Trays

Demonstration on:

a) Smithy operations, upsetting, swaging, setting down and bending.

b) Foundry operations like mould preparation for gear and step cone pulley.

c) Assembly of centrifugal pump

d) Assembly of air conditioner

GROUPB(ELECTRICAL&ELECTRONICS)

III   ELECTRICAL ENGINEERING PRACTICE   15

1.   Residential house wiring using Switches, Fuse, Indicator, Lamp and Energy meter.

2.   Fluorescent Lamp Wiring.

3.   Staircase Wiring.

4.   Measurement of Voltage, Current, Power and Power factor in electrical circuit.

5.   Measurement of Energy using Analog & Digital Energy meter.

6.   Measurement of Earth Resistance.

7.   Study of Industrial house wiring.

8.   Identification & Study of protective devices: Fuses & Fuse carriers, MCB, ELCB and Isolators with ratings and usage.

IV ELECTRONICS ENGINEERING PRACTICE   15

1.   Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, RMS period, frequency) using CR.

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 and FWR.

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

CO1: Carry out various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering

CO2: Fabricate carpentry components and pipe connections including plumbing works and use welding equipment's to join the structures.

CO3: Carry out the basic machining operations, make the models using sheet metalworks. Illustrate on centrifugal pump, air conditioner, operations of smithy, foundry and fittings

CO4: Carry out basic home electrical works and measure the electrical quantities

CO5: Elaborate on the electronics components, gates and soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets
2. Carpentry vice (fitted to work bench)	15 Nos.
3. Standard woodworking tools	15 Sets
4. Models of industrial trusses, door joints, furniture joints	5 each

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.
2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets
7. Moulding table, foundry tools	2 Sets
8. Power Tool: Angle Grinder	2 Nos.
9. Study-purpose items: centrifugal pump, air-conditioner	One each
10. Fitting tools, Hack saw frame, 12' file, hack saw blade	15 Nos.

ELECTRICAL

1.	Assorted electrical components for house wiring	15 Sets
2.	Fluorescent Lamp	15 Sets
3.	Electrical measuring instruments	10 Sets
4.	Analog & Digital energy meter	5 Sets
5.	Megger	2

ELECTRONICS

1.	Soldering guns	10 Nos.
2.	Assorted electronic components for making circuits	50 Nos.
3.	Small PCBs	10 Nos.
4.	Multimeters	10 Nos.
5.	Study purpose items: Telephone, FM radio, low-voltage power supply	

CO - PO and CO - PSO MAPPING

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	1	1	1	1	2	3	4
1	3					1						1	2		3	
2		1	2		3						1				2	
3				3	2							1	1			2
4		2	3	1	2									2		
5		3	2	2					1				2			
Avg	3	2	2	2	2	1	-	-	1	-	1	1	2	2	3	2

EN3211   **PROFESSIONAL ENGLISH – II**   **L T P C**

                                                                        3 0 0 3

OBJECTIVES

The course prepares the second semester Engineering students

To develop strategies and techniques to enhance their reading skills.

To engage them in meaningful activities in order to improve their listening, speaking, reading and writing skills.

To improve their ability to write effective job application, resumes and draft impressive reports.

To develop analytical thinking skills for problem solving in communicative contexts.

To participate in group discussions.

UNIT – I: MAKING COMPARISON   9

Listening: Clippings of Ted talk, cartoon and interviews of sports personalities for listening and discussion.

Speaking: Descriptions and discussions based on newspaper.

Reading: Learning shades of meaning (using Thesaurus) and inferring the context from general passages.

Writing: Compare & Contrast essays and Jumbled Sentences.

Language and Vocabulary development: Prepositional phrases, contextual meaning of words. Verbal Analogy, Same word used as Noun and Verb.

UNIT – II: EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 9

Listening: Anecdotes to be read from books like Chicken Soup books. Evaluative listening – Advertisement and Product description.

Speaking: Marketing a product, persuasive speech

Reading: Description of any product / jewellery, Brochures and Manual.

Writing: Formal letters- letters of complaint, appreciation, and suggestion, Comprehension and E-mail (formal)

Language and Vocabulary development: Active & Passive, Infinitive, Gerund, Purpose Statements, Adverbs and Word formation

UNIT – III: ABILITY TO PUT IDEAS OR INFORMATION COGENTLY   9

Listening: Listen to English songs and find the lyrics/new words

Speaking: Role play and Interviews

Reading: Reading magazine articles, Excerpts from literary texts

Writing: Job Application, Resume, Cover letter, SWOC Analysis and Recommendations.

Language and Vocabulary development: Correction of errors, If conditional, Sentence completion and Connotations.

UNIT – IV: ANALYZING PROBLEMS AND EXPRESSING SOLUTIONS   9

Listening: Watching Stand-up comedies and comprehending ideas expressed there.

Speaking: Speak about the Stand-up comedies viewed and express personal views about the same

Reading: Reading different types of books (novels, short stories, biographies, magazines etc. and speaking about the same.

Writing: Dialogue Writing, Checklist and Problem Solving essays.

Language and Vocabulary development: Reported Speech, Modals, Slogan writing and Conjunctions.

UNIT – V: REPORTING EVENTS   9

Listening: Listening to spot errors, listening to varied dialects and accents of English.

Speaking: Group discussion- Expression of opinions, assertion, coercion etc.

Reading: Reading life experiences of common man from magazines.

Writing: Accident Report / Survey Report and Letters to the Editor.

Language and Vocabulary development: Numerical Adjective, Idioms, Vocabulary – Shades of Meaning.

TOTAL: 45 PERIODS

COURSE OUTCOME

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

CO1: To compare and contrast ideas and information from technical texts.

CO2: To incorporate basic grammar structures to express appreciation, suggestion and complaint in writing**.**

CO3: To draft effective resumes using appropriate vocabulary and to avoid common errors.

CO4: To analyse problems so as to arrive at appropriate solutions and to communicate relevantly.

CO5: To draft technical reports, letters and to express ideas creatively.

TEXT BOOKS:

1. English for Science and Technology Cambridge University Press,2021.
   Dr.Veena Selvam, Dr.Sujatha Priyadarshini, Dr. Deep Mary Francis,
   Dr.K.N.Shoba and Dr.Lourdes Joevani, Department of English, Anna University.
2. Technical Communication – Principles and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, 2016, New Delhi.
3. Technical English for Professional – Advanced by C. Gangalakshmi, B. Rathika and L. Saranraj, Cengage Learning India Pvt. Ltd.,2022.

REFERENCES:

1. Learning to communicate – Dr. V. Chellammal, Oxford Univ.Press,2001 New Delhi.

2. Business Correspondence and Report Writing by Prof. R. C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
3. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.
4. Improve Your Writing ed. V.N Arora Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
5. English For Engineers and Technologists, Orient Blackswan Private Ltd. Department of English, Anna University,2020.

CO - PO and CO - PSO MAPPING

Course Outcomes	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	-	1	2	1	-	-	-	-	-	3	-	1	-	-	-	-
CO2	2	2	1	2	2	-	-	-	-	3	1	1	-	-	-	-
CO3	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	-
CO4	2	3	2	3	-	-	2	-	-	3	-	-	-	-	-	-
CO5	2	-	1		-	-	-	-	-	2	-	-	-	-	-	-
Avg	2	2	1	2	2	-	2	-	-	3	1	1	-	-	-	-

MA3222   **STATISTICS AND NUMERICAL METHODS**   **L T P C**
                                                                  3 1 0 4

OBJECTIVES:

This course aims at providing the necessary basic concepts of statistical and Numerical Methods for solving numerically different problems of engineering and Technology.

To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.

To introduce the basic concepts of solving algebraic and transcendental equations.

To introduce the numerical techniques of interpolation in various intervals and differentiation and integration in engineering and technology disciplines.

To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT-I: STATISTICAL HYPOTHESIS TESTS   **9L+3T**

Sampling distributions - Tests for single mean and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT-II: EXPERIMENTAL DESIGN FOR ANOVA   **9L+3T**

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design

UNIT-III: SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS   9L+3T

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton - Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative method of Gauss Seidel – Dominant Eigenvalue of a matrix by Power method.

UNIT-IV: INTERPOLATION, NUMERICAL DIFFERENTIATION AND
**   NUMERICAL INTEGRATION**   **9L+3T**

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical integrations using Trapezoidal, Simpson's rules.

UNIT-V: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL
**   EQUATIONS**   **9L+3T**

Single step methods: Taylor's series method - Euler's method - Modified Euler's method Fourth order Runge-Kutta method for solving first order equations - Multi step

methods: Milne's and Adams -Bash forth predictor corrector methods for solving first order equations.

TOTAL: 45L+15T PERIOD

OUTCOMES:

Apply the concept of testing of hypothesis for small and large samples in real life problems.

Apply the basic concepts of classifications design of experiments in the field of agriculture.

Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.

Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

Solve the ordinary differential equations with initial and boundary conditions by using certain techniques with engineering application.

TEXT BOOKS:

1. Grewal. B.S. and Grewal. J.S., "Numerical Methods in Engineering and Science", 10th Edition, Khanna Publishers, New Delhi,2015.

2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition,2015.

REFERENCE BOOKS:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning,2016.

2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

3. Gerald.C.F., Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia,NewDelhi,2006.

Course Outcomes	PROGRAM OUTCOMES												Program Specific			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Avg	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-

No Correlation -   Low 1   Medium 2   High 3

PH3233 **PHYSICS FOR ELECTRONICS ENGINEERING**   **L T P C**
For Second Semester - B.E / B.Tech   **3 0 0 3**
(Common to EEE, ECE and EIE)

OBJECTIVES:

- To understand the concept of free electron theories and to get knowledge on conducting and superconducting materials

- To impart the knowledge about basics of doping and types of semiconductors.

- To enable the idea of magnetism and dielectric properties.

- To explore the basics of interaction of photon with materials

- To enhance the fundamental knowledge of molecular electronics and nano devices.

UNIT- I: CONDUCTING AND SUPERCONDUCTING MATERIALS   **9**

Classical free electron theory-Postulates - Expression for electrical conductivity and Thermal conductivity - Wiedemann-Franz law - Success and failures - Quantum free electron theory (qualitative) - Fermi Distribution function - Density of energy states - carrier concentration – Superconductors – Properties - Applications : Magnetic levitation, Cryotron and SQUID.

UNIT- II: SEMICONDUCTOR AND TRANSPORT PHYSICS   **9**

Properties - Direct and indirect semiconductors - Intrinsic Semiconductors - Carrier concentration in intrinsic semiconductors - Extrinsic semiconductors - Carrier concentration in N - type & P- type semiconductors - Fermi energy - Variation of fermi level with temperature - Carrier transport - Drift and Diffusion transport - Hall Effect - Theory and Experiment - PN junction diode - Forward and reverse bias characteristics.

UNIT- III: MEMORY STORAGE MATERIALS   AND DIELECTRIC MATERIALS
                                                                  9

Magnetism in materials - Diamagnetic material, Paramagnetic material and Ferromagnetic material - Ferromagnetic domain theory - Hysteresis Curve - Hard and soft magnetic material - Bubble memory - Dielectric material : Electronic polarization, ionic polarization,orientational polarization and space - charge polarization - dielectric loss - dielectric breakdown - high - k dielectrics.

UNIT – IV: OPTOELECTRONIC DEVICES   9

Classification of optical materials Optical processes in semiconductors: optical absorption and emission - carrier injection and recombination - photo diode - solar cell - photo detectors - Light Emitting Diode - Organic LED - Optical switching – Plasmonics

UNIT – V : MOLECULAR ELECTRONICS   9

Introduction to Nanotechnology - Size dependence of Fermi energy - quantum confinement – Excitons – HOMO - LUMO - Organic semiconductor (qualitative) - quantum structures - Quantum wire, Quantum Well, Quantum Dot laser - quantum interference effects – Tunneling : Resonant Tunnelling Diode (RTD) - Resonant Tunnelling Transistor (RTT) - Coulomb blockade effects - Single electron phenomena   and Single electron Transistor - Nano Robotics.

TOTAL:45 PERIODS

OUTCOMES:

After the completion of the course, the students should be able
1. To gain knowledge in energy band structures and superconducting materials.
2. To acquire knowledge on basics of semiconductor physics and its applications invarious devices.
3. To gain knowledge about the properties and applications of magnetic and dielectric materials.
4. To have the necessary understanding on the functioning of optical materials for optoelectronic devices.
5. To understand the basics of quantum structures and their applications in nano electronics.

TEXT BOOKS:

1. Kasap, S.O., "Principles of Electronic Materials and Devices", McGraw- Hill Education, 2007.
2. M. Arumugam, "Semiconductor Physics and optoelectronics", Anuradha agencies,2003.
3. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009.
4. Kittel, C., "Introduction to Solid State Physics", Wiley, 2005.
5. B.K.Pandey., S.Chaturvedi., "Engineering Physics", Cengage Learning, 2012.
6. V.Rajendiran, Engineering Physics, Tata McGraw-Hill, New Delhi. 2011.

REFERENCE BOOKS:

1. B. N. Sankar., S. O. Pillai., "Engineering Physics" New age international publishers, 2007.
2. Donald .A.Neamen., "Semiconductor Physics and devices" Tata Mc Graw-Hill, New Delhi. 2007
3. Rogers, B., Adams, J. & Pennathur, S. "Nanotechnology: UnderstandingSmall Systems", CRC Press, 2014.

Course Outcomes	PROGRAM OUTCOMES											
	1	2	3	4	5	6	7	8	9	10	11	12
1	3	1	-	-	1	1	-	-	-	-	-	1
2	3	2	2	-	2	-	-	-	-	-	-	1
3	3	2	1	1	-	2	-	-	-	-	-	1
4	3	-	1	-	3	2	3	-	-	-	-	1
5	3	-	2	1	2	1	-	-	-	-	-	1
Avg	3	2	2	1	2	2	3					1

1 - low, 2 – medium, 3 – high, '-' – no correlation

CH3223 **CHEMISTRY OF ELECTRONIC MATERIALS** **L T P C**
Second Semester-B.E./B.Tech., **3 0 0 3**
(Common to ECE, EEE and EIE)

OBJECTIVES

To make the students accustomed to carbon-based materials, their synthetic properties, and their application in the field of electrical and electronics.

To comprehend the synthetic properties and applications of polymers in engineering applications.

To acquaint the student with the principles of electrochemical reactions, and corrosion.

To understand the working principle and applications of analytical instruments in chemical analysis.

To make the student conversant with the basics of energy sources and storage devices, their properties, and applications.

UNIT I **CHEMISTRY OF CARBON** **9**

Catenation property of carbon-carbon based compounds - structure and bonding - hydrocarbons: fuels, carbon-based organic materials, activated carbon, and allotrope of carbon: properties - applications of diamond, graphite, graphene, fullerenes, and carbon nanotubes - types – preparation – properties - applications (electrical and electronic field) - future perspective in energy conversion and storage.

UNIT II **ENGINEERING POLYMERS** **9**

Polymers: Classification - types of polymerization - plastic and its types – applications - Engineering polymers: ABS, PVC, Nylon-6, Nylon-6,6, Teflon, Kevlar and PEEK - preparation, properties and uses - fiber reinforced polymers - conducting polymers: types, and applications - applications of polymers in medicine and surgery.

UNIT III **ELECTROCHEMISTRY AND CORROSION** **9**

Electrode - electrode reaction - redox reaction - origin of electrode potential, oxidation potential - reduction potential - measurement and applications, electrochemical series and its significance - electrochemical cell - Nernst equation (derivation). Corrosion - causes - factors - types - chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electroplating of Au - electroless plating of Ni - paints - constituents and function.

UNIT IV **ENERGY SOURCES AND STORAGE DEVICES** **9**

Introduction - nuclear energy - light water nuclear power plant - breeder reactor, solar energy conversion - solar cells: principle, working and applications, types of

batteries - primary battery (alkaline battery), secondary battery (lead acid battery, NICAD battery, lithium-ion battery), fuel cells (H2-O2 fuel cell). Supercapacitors: storage principle, applications. Electric vehicles-working principles.

UNIT V   INSTRUMENTAL METHODS AND ANALYSIS   9

Introduction, absorption of radiation, types of spectra, UV-Visible and IR Spectrophotometer: Instrumentation and applications, cyclic voltammetry for redox system. Thermal methods of analysis TGA, DTA, DSC. Sensors: oxygen, pulse oximeter, biometrics, and glucose sensor.

Total Periods: 45

OUTCOMES

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

1. To explain the carbon-based materials' properties and their engineering applications.
2. To gain knowledge on various types of engineering polymers.
3. To understand the process of electrochemistry and its application in corrosion control.
4. To appraise the working principles and applications of analytical instruments.
5. To ability to understand energy sources and storage devices.

TEXTBOOKS

1. Shikha Agarwal, "Engineering Chemistry"-Fundamentals and Applications, 2nd Edition, Cambridge University Press, New Delhi, 2019.
2. P. C. Jain and Monica Jain, "Engineering Chemistry", 18th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2021.
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. S.S. Dara and S.S. Umare, "A Text Book of Engineering Chemistry", 12th Edition, S. Chand & Company LTD, New Delhi, 2018.
3. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Publishing Company LTD, 2023.
4. R. V. Gadag and A. Nithyananda Shetty, "Engineering Chemistry", 3rd Edition, Wiley & I.K. International (P), LTD, New Delhi, 2019.

Course Outcomes	PROGRAM OUTCOMES												Program Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	2	3	2	2	-	-	-	-	-	-	3	-	-	-	-
CO2	2	2	1	2	1	1	-	-	-	-	-	2	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	1	1	-	-	-
CO4	3	3	3	2	2	-	-	-	-	-	-	1	2	-	-	-
CO5	3	3	3	2	2	-	1	-	-	-	-	3	-	-	-	-
AVG	3	2	2	2	2	1	1	-	-	-	-	2	2	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

GE3231   **PROBLEM SOLVING AND PYTHON PROGRAMMING**   **L T P C**

<div align="center">(Common to All branches)   3 0 0 3</div>

OBJECTIVES

- To know the basics of Python programming and write simple programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures and its implementation – lists, tuples, dictionaries.
- To understand Object Oriented Concept in Python.

UNIT I   PYTHON BASICS   9

Introduction to Python – Literals – Variables and Identiiers – Data Types – Input Operation – Comments – Reserved words – Indentation – Operators and Expressions – Modes of python. Conditionals: Boolean values and operators - conditional if - alternative if - chained conditional - Iteration, Illustrative programs: Basic Arithmetic Operations, GCD of numbers, Square root (Newton's Method).

UNIT II   FUNCTIONS, LIST, TUPLES   9

Functions, function definition and use. **Fruitful functions:** return values, parameters, local and global scope, recursion. **Lists:** list operations, list slices, list methods, list loop, mutability, list parameters; **Tuples:** tuple assignment, tuple as return value. Comparison of Lists and tuples. Illustrative programs: exchange the values of two variables, square root, Linear and Binary search. Fibonacci series using functions.

UNIT III   STRINGS, DICTIONARY, SET   9

Strings: string slices, immutability, string functions and methods, string module. **Dictionaries:** Operations (create, access, add, remove) and methods. (Insert, delete).Set operation (Access, Add, Remove). Illustrative programs: creates a dictionary of radius of a circle and its circumference.

UNIT IV   FILES, EXCEPTIONS, MODULES AND PACKAGES   9

Files and exception: Text Files, Reading and Writing files, Format operator; Errors and Exceptions, Handling Exceptions, Multiple Except blocks, Modules, Packages; Illustrative programs: word count, copy file, Creating user defined Exceptions.

UNIT V   CLASSES AND OBJECTS   9

Classes and Objects: Introduction, Classes and Objects, Defining Classes, Creating Objects, Data Abstraction and Hiding, The Class Method and Self Argument, The __init ( ) method, Class Variables and Object Variables, Public and Private data members, Private Methods. Illustrative Programs: Creating Student Class and Objects.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, learners will be able to:
- Develop simple computational problems using control flow statements.
- Decompose a Python program into functions, Modules and Packages.
- Represent compound data using Python lists, tuples, Strings, Set and dictionaries.
- Read and write data from/to files and Exception handling in Python Programs.
- Understand the concepts of Object Oriented Programming and to develop real time applications.

TEXT BOOKS:

1. Reema Thareja, **"Python Programming using Problem solving Approach",** Oxford Higher Education,2018.

2. Allen B. Downey, **"Think Python: How to Think Like a Computer Scientist"**, 2nd edition,   Updated   for   Python   3,   Shroff/O'Reilly   Publishers,   2016 (http://greenteapress.com/wp/think-python/)

3. Guido van Rossum and Fred L. Drake Jr, **"An Introduction to Python"** – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. Charles Dierbach, **"Introduction to Computer Science using Python: A Computational Problem-Solving Focus"**, Wiley India Edition, 2013.

2. John V Guttag, **"Introduction to Computation and Programming Using Python''**, Revised and expanded Edition, MIT Press , 2013

3. Kenneth A. Lambert, **"Fundamentals of Python: First Programs"**, CENGAGE Learning, 2012.

4. Paul Gries, Jennifer Campbell and Jason Montojo, **"Practical Programming: An Introduction to Computer Science using Python 3"**, Second edition, Pragmatic Programmers,LLC,2013.

5. Robert Sedgewick, Kevin Wayne, Robert Dondero, **"Introduction to Programming in Python: An Inter-disciplinary Approach"**, Pearson India Education Services Pvt. Ltd., 2016.

WEB REFERENCES:

1. http://greenteapress.com/wp/think-python/
2. www.docs.python.org
3. https://nptel.ac.in/courses/106/106/106106182/

CO's	PO's												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	3	3	3	2	-	-	-	-	-	2	2	2			1
2	3	3	3	3	2	-	-	-	-	-	2	2			3	
3	3	3	3	3	2	-	-	-	-	-	2	-			1	
4	2	2	-	2	2	-	-	-	-	-	1	-	3		2	
5	1	2	-	-	1	-	-	-	-	-	1	-				1
6	2	2	-	-	2	-	-	-	-	-	1	-	1			
AVg.	2	3	3	3	2	-	-	-	-	-	2	2	2		2	1

GE3211   தமிழரும் தொழில்நுட்பமும்   **L T P C**
                                                                     1 0 0 1

அலகு I   நெசவு மற்றும் பானைத் தொழில்நுட்பம் :   3
சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் – கருப்பு
சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II   வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்   3
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில்
வீட்டுப் பொருட்களில் வடிவமைப்பு. சங்க காலத்தில் கட்டுமான
பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய
விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர்
காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் –
நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல்,
மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் –
செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ –
சாரோசெனிக் கட்டிடக் கலை.

அலகு III   உற்பத்தித் தொழில்நுட்பம் :   3
கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை –
இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சான்றுகளாகச் செம்பு மற்றும்
தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும்
தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண்
மணிகள் – சங்கு மணிகள் – எழும்புத்துண்டுகள் – தொல்லியல்
சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV   வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் : 3
அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின்
முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக
வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச்
சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும்
முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார்
சமூகம்.

அலகு V   அறிவியல் தமிழ் மற்றும் கணித்தமிழ் :   3
அறிவியல் தமிழின் வளர்ச்சி – கணித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை
மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ்
இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ்
அகராதிகள் – சொற்குவைத் திட்டம்.

TOTAL : 15 PERIODS

GE3211　　　　　　　　**TAMILS AND TECHNOLOGY**　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　1 0 0 1

UNIT I　　　　**WEAVING AND CERAMIC TECHNOLOGY**　　　　　**3**

Weaving Industry during sangam Age – Ceramic technology – Black and Red Ware
Potteries (BRW) – Graffiti on Potteries.

UNIT II　　　　**DESIGN AND CONSTRUCTION TECHNOLOGY**　　　**3**

Designing and Structural construction House & Designs in household materials during
Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage
Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great
Temples of Cholas and other worship places – Temples of Nayaka Priod – Type study
(Madurai Meenakshi Temple) – Thirumalai Nayakar Mahal – Chetti Nadu Houses, Indo
– Saracenic architecture at Madras during British Period.

UNIT III　　　　**MANUFACTURING TECHNOLOGY**　　　　　　**3**

Art of Ship Building – Metallurgical studies – Iron industry – Iron smelting, steel –
Copper and gold – Coins as source of history – Minting of Coins – Beads making –
Industries Stone beads – Glass beads – Terracotta beads – Shell beads / bone beats
– Archeological evidences – Gem stone types described in Silappathikaram.

UNIT IV　　　　**AGRICULTURE AND IRRIGATION TECHNOLOGY**　　**3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Perio, Animal
Husbandry – Wells designed for cattle use – Agriculture and Agro Processing –
Knowledge of Sea – Fisheries – Pearl – Conche diving – Ancient Knowledge of Ocean
– Knowledge Specific Society.

UNIT V　　　　**SCIENTIFIC TAMIL & TAMIL COMPUTING**　　　　**3**

Development of Scientific Tamil – Tamil computing – Digitalization of Tamil
Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital
Library – Online Tamil Dictionaries – Sorkuvai Project.

　　　　　　　　　　　　　　　　　　　　　　　　TOTAL : 15 PERIODS

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.Subatamanian, Dr.K.D. Thirunavukkarasu)
   (Published by : International Institute of Tamil Studies).
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 Vaigal' (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, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by : RMRL) –
    Reference Book.

GE3233   ENGINEERING GRAPHICS AND DESIGN   L   T   P   C

(Common to all branches of B.E. / B.Tech. Programmes)   **1**   **0**   **4**   **3**

OBJECTIVES:

The main learning objective of this course is to impart knowledge

1. To draw the conics curves and special curves, use BIS conventions, and specifications for engineering drawing.
2. To draw the orthographic projection of lines and plane surfaces.
3. To draw the projections and solids and Isometric projection of simple solids.
4. To draw the section of solids and the development of surfaces.
5. To draw free hand sketching of basic geometrical constructions, multiple views of objects and Perspective Projection of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)   1

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 SPECIAL CURVES   10

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid (Rolling Circle rolls on flat surface only). construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

UNIT-II: PROJECTION OF POINTS, LINES AND PLANE SURFACES   16

Orthographic projection- Principles-Principal planes - First angle projection-projection of points at the First Quadrant only. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) which inclined to both the principal planes by rotating object method.

UNIT-III: PROJECTION OF SOLIDS AND ISOMETRIC PROJECTION   16

Projection of simple solids like prisms, pyramids, cylinders and cones when the axis is inclined to one of the principal planes by the rotating object method. Principles of

isometric projection – isometric scale – Isometric projections of simple solids - Prisms, pyramids, cylinders, cones - isometric view of the object from the 2D coded plan.

UNIT-IV: **PROJECTION OF SECTIONED SOLIDS & DEVELOPMENT OF SURFACES**   **16**

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

UNIT-V: **FREE-HAND SKETCHING AND PERSPECTIVE PROJECTIONS**   **16**

Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects. Perspective projection of simple solids-Prisms and pyramids by visual ray method.

TOTAL: (L=15; P=60) 75 PERIODS

COURSE OUTCOMES:

Upon completion of this course, the students will be able:

1. To construct the conics curves & special curves, use BIS conventions, and specifications for engineering drawing.
2. To construct the orthographic projection of lines and plane surfaces.
3. To construct the projections and solids and Isometric projection of simple solids.
4. To construct projections of section of solids and development of surfaces.
5. To construct free hand sketching of basic geometrical constructions, multiple views of objects and Perspective Projection of simple solids

TEXTBOOKS:

1. N.D.Bhatt, "Engineering Drawing (Plane and Solid Geometry)", Charotar Publishing House PVT. LTD. 53rd Edition 2019 (Fifth Reprint)
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 15th Edition 2018

REFERENCE BOOKS:

1. T. Jeyapoovan, "Engineering Graphics Using Auto CAD", Vikas Publishing House Pvt. LTD, seventh Edition, 2015.

2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.

3. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2011.

4. 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.

5. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2013.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.

4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.

5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.

2. All questions will carry equal marks of 20 each making a total of 100.

3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scales to fit solutions within A3 size.

4. The examination will be conducted in appropriate sessions on the same day

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
2	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
3	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
4	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
5	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1
AVG	2	-	3	-	1	-	-	-	1	3	-	2	2	1	1	1

<table>
<tr><td></td><td style="text-align:center">**ENGINEERING SCIENCES LABORATORY**</td><td>**L T P C**</td></tr>
<tr><td>**GE3221**</td><td style="text-align:center">(Common to all branches of B.E. / B.Tech Programmes)</td><td>0 0 4 2</td></tr>
</table>

OBJECTIVES:

- To gain practical knowledge and to co-relate with the theoretical studies.
- To achieve perfectness in experimental skills and the study of practical applications.
- To bring more confidence and ability to develop and fabricate engineering and technical equipment.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To make the student as an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)
1. Determination of the electrical conductivity of metals by plotting a current- voltage characteristic curve.
2. Determination of band gap of a semiconductor.
3. Determination of Fermi energy. (Measurement of Fermi energy in copper).
4. Study of I-V characteristics of solar cell and determination of its efficiency
5. Determination of electrical resistivity of metal and alloy –Carey foster Bridge.
6. Measurement of susceptibility of paramagnetic solution by Quinke's method.
7. Study of magnetic Hysteresis-B-H curve.
8. Determination of the dark resistance of light detective resister (LDR).
9. Measurement of Temperature using LM35.

TOTAL: 30 PERIODS

OUTCOMES:

At the end of the course, the students should be able

1. To understand the functioning of various physics laboratory equipment.
2. To use graphical models to analyze the laboratory data and to solve problems individually and collaboratively.
3. Use mathematical models as a medium for quantitative reasoning and describing physical reality.
4. Access, process and analyze scientific information.
5. Solve problems individually and collaboratively

TEXTBOOKS:

1. Wilson J.D. and Hernandez C.A., ―Physics Laboratory Experimentsǁ, Houghton Mifflin Company, New York, 2005.
2. S. Srinivasan, A Text Book of Practical physics, S. Sultan Chand publications. 2005
3. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

Course Outcomes	PROGRAM OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
2	3	3	2	1	1	-	-	-	-	-		-	-	-		-
3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
Avg	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-

1 - low, 2 – medium, 3 – high, '-' – no correlation

GE3221   **ENGINEERING SCIENCES LABORATORY**

CHEMISTRY LABORATORY: (Any five experiments to be conducted)   **L T P C**
                                                                        0 0 2 1
OBJECTIVES

> To train the students in basic experimental skills in water contaminants such as copper and chromium.
> To familiarise the students with electroanalytical techniques such as pH metry, potentiometry, and conductometry to determine impurities in aqueous solutions.
> To familiarize the students with the determination of the molecular weight of a polymer by a viscometer.
> To make the student up-to-date with the properties and nature of alloys experimentally.
> To demonstrate the analysis of coal.

1. Estimation of copper content of the given solution by Iodometry.
2. Determination of strength and amount of acids in a mixture of acids using a conductivity meter.
3. Determination of strength and amount of HCl present in the whole of the given solution using a conductivity meter.
4. Estimation of the iron content of the given solution using a potentiometer.
5. Determination of chromium by EDTA titration.
6. Determination of strength of given hydrochloric acid using a pH meter.
7. Determine the molecular weight of the polyvinyl alcohol using an Ostwald viscometer.
8. Estimation of Nickel in steel.
9. Proximate Analysis of Coal.
10. Corrosion experiment-weight loss method.
11. Determination of COD value of industrial effluents.

TOTAL: 30 PERIODS

OUTCOMES

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

1. To find the quality of water samples for copper and chromium present in water.
2. To recognize the amount of various ions present in the water sample through volumetric and instrumentation techniques.
3. To identify the molecular weight of the polymer using an Ostwald viscometer.
4. To recognize an environmental hazardous and threshold limit for industrial effluents.

5. To recommend quality of coal and steel when it is exposed to various environment.

TEXT BOOKS

1. Vogel's Textbook of Quantitative Chemical Analysis (8th Edition, 2014).
2. Suchi Tiwari, Engineering Chemistry Lab Manual, Scitech Publications (India) Pvt. Ltd. (2nd Edition, 2013).
3. Pushpendra Kumar, Laboratory Manual for Engineering Chemistry, Reyansh Authortopic Pvt. Ltd., (1st Edition, 2022).

Course Outcomes	PROGRAM OUTCOMES												Program Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	1	1	1	1	-	1	-	-	-	-	-	-	-	-	-
CO2	2	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
CO3	2	1	1	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	1	1	2	2	2	-	-	-	-	-	-	-	-
CO5	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
AVG	2	1	1	1	1	2	2	2	-	-	-	-	-	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

GE3232 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

L T P C
0 0 4 2

OBJECTIVES:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries and read and write data from/to files in Python.
- Use simple Object Oriented Concepts.

LIST OF PROGRAMS

1. Compute the GCD of two numbers.
2. Find the square root of a number. (Newton's method)
3. Find exponentiation of a number. (power of a number)
4. Find the maximum of a list of numbers.
5. Program for basic calculator operations using functions.
6. Generate Fibonacci series using function.
7. Program for Armstrong number.
8. Program for check the number is Palindrome or Not.
9. Program for sum of array of numbers.
10. How to create, slice, change, add, delete and index elements using list.
11. Linear search and Binary search.
12. Find First n prime numbers.
13. Program to remove duplicate elements from a list.
14. Program for addition and transpose of a matrix.
15. How to create, slice, change, delete and index elements using Tuple.
16. Write a program to reverse the string.
17. How to change, delete, add and remove elements in Dictionary.
18. Create a dictionary of radius of circle and its circumference.
19. Program for count the number of words in a file.
20. Find the most frequent words in a text read from a file.
21. Program for student information system using class and objects.
22. Program for Employee Payroll Processing using class and objects.

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

TOTAL: 60 PERIODS

COURSE OUTCOMES

- Develop solutions to simple computational problems using Python programs.
- Solve problems using conditionals and loops in Python.
- Develop Python programs by defining functions and calling them.
- Use Python lists, tuples and dictionaries for representing compound data.
- Develop Python programs using files and OOPS concept.

CO – PO – PSO Mapping

CO'	PO's												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	3	3	3	3	-	-	-	-	-	3	2	1	3		
2	3	3	3	3	3	-	-	-	-	-	3	2			2	
3	3	3	3	3	2	-	-	-	-	-	2	-		3		2
4	3	2	-	2	2	-	-	-	-	-	1	-			1	
5	1	2	-	-	1	-	-	-	-	-	1	-	1		2	2
6	2	-	-	-	2	-	-	-	-	-	1	-	1		1	
AVG	2	3	3	3	2	-	-	-	-	-	2	2	1	3	2	2

GE3251   **NSS / YRC / NSO / Club Activities#**   **L   T   P   C**

                                                                      0   0   1   1#

GE3251-

Fine Arts Club VECTORIANS – Skill based activities

OBJECTIVES:

To enhance the inbuilt talents in arts and crafts and fine arts activities.
To explore and exhibit theirs qualities in cultural activities as well as in
the leadership.

ACTIVITIES   **5**

1. **ARTS & CRAFTS** - The students will be given with innovative Theme, they have
    to   Show their talents in one hour time with basic facilities provided.   **(1)**

2. **SINGING & DANCING** - The students are expected to present their talents on
    spot or With given Theme, either solo or group performance.   **(2)**

3. **MIME & DRAMA** - Students will be given 5 - 7 minutes of time to present
their variety Entertainments in way of Mono acting or Drama .   **(2)**

COURSE OUTCOME

1. To enable students to explore their inbuilt talents in fine arts activities.

2. To motivate the students to show case their cultural and leadership qualities.

References:

1.   https://www.youtube.com/watch?v=1mkESRWiSKc – Teach your own crafts.
2.   https://www.youtube.com/watch?v=YHqwrDGywH4 – How to teach Arts & Crafts

GE3251- Catalysis Club

Catalysis – Skill-based activities

Objectives:

To inculcate a scientific attitude and temper.
To provide an opportunity to develop constructive, explorative & inventive ideas among the students.
To develop training in the scientific method of problem-solving for engineering

1. **Quiz/debate**- the latest advancement in Chemistry towards engineering   (2)

2. **Essay competition/Chart preparation** - Environmental sustainability   (2)

3. **Nature Study - field visit to eco-parks etc.**   (1)

COURSE OUTCOME

1. To promote inquisitiveness among the students and inculcate Scientific mind mapping.

2. To develop students, interest and participation in the practical applications of the knowledge related to environmental sciences.

3. Take part in practical, hands-on science activities close to nature.

REFERENCE

1. M. Senapati, Advanced Engineering Chemistry, Infinity science press, New Delhi, 2007.
2. https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/environmental-sustainability
3. https://www.indiabix.com/general-knowledge/chemistry/

NSS/NCC/NSO/YRC&CLUBACTIVITIES

Eclectic Lingua – Skill based activities

OBJECTIVES:

To enhance the communicative competence of the first-year engineering students by means of creating opportunity for impromptu/ /spontaneous speeches.
To upgrade the English language skills of students by introducing appropriate vocabulary in different situations.

ACTIVITIES   **5**

1. **Extempore**- Giving expression to thoughts (2)

2. **Building Vocabulary**-Using relevant set of words for different contexts (2)

3. **Pronunciation**- Speaking accurately and fluently (1)

COURSE OUTCOME

1. To enable students to express themselves easily and coherently.

2. To help students to speak the language using the right words and pronouncing them correctly.

Reference

https://www.cambridgeenglish.org/learning-english/activities-for-learners/?skill=pronunciation

https://www.quillsandquotes.ca/post/12-fun-games-to-get-students-public-speaking

EULER.COM – Skill based activities

OBJECTIVES:

To enhance the Logical reasoning of the first-year engineering students by means of creating opportunity to improve the aptitude skill.
To explore the applications of Mathematics in the field of Engineering, Science and Technology and to utilize this skill for their academic
activities.

ACTIVITIES   **5**

1. OLYMPIAD- The students will be provided with 25 questions in Engineering Mathematics. This should be completed in one hour. **(1)**

2. MATHEMATICAL MODELLING- The students are expected to present physical models

(Working as well as static models) based on the application of Engineering Mathematics **(2)**

3. PAPER PRESENTATION- Students will be provided 5-7 minutes of time to present their findings in application of Mathematics. **(2)**

COURSE OUTCOME

1. To enable students to explore their mathematical reasoning skills.

2. To motivate the students to apply Mathematics in Engineering and Technology and demonstrate their work by means of Physical model and present their research article.

References:

1. Advanced Engineering Mathematics , Erwin Kreyszig, 10th Edition, Wiely India Pvt Ltd.
2. https://www.stewartcalculus.com/

NATIONAL SERVICE SCHEME (NSS)

Objectives:

The main objectives of this course are:

1. To help learners know about NSS in the context of youth, community and voluntary service.

2. To teach the importance of health, hygiene and sanitation for a healthy Nation.

3. To understand the community in which they work.

4. To identify the problems of the community and involve them in problem- solving.

5. To develop the capacity to meet emergencies and natural disasters.

6. To practice the National integration and social harmony.

7. To utilize their knowledge in finding practical solutions to individual and community

Credit:

Total Lecture Hours / Semester	Total Tutorial Hours / Semester	Total Practical Hours / Semester	Credit
6	0	18	1*

* To be conducted after college hours and week ends

Outcome:

Learners will have the knowledge about NSS and its role in the fields of health, hygiene, emergencies & natural disasters and involve them in problem-solvingof the nearest community so as to build a strong country.

Syllabus:

Semester : I&II   Attendance weightage : 50   Activities weightage : 50

Topic -I :Introduction and Basic Concepts of NSS **[8]**

    a. History – Aim – Objectives of NSS

    b. Emblem – Motto – Badge - Song

    c. Organizational structure - Roles and Responsibilities of NSS

    d. d. Regular activities

    e. Any approved indoor / outdoor programs by the Principal

Topic-II : Youth Leadership, Social Harmony and National Integration   [8]

    a. Meaning and types of Leadership

    b. Qualities of good leaders and leadership

    c. Importance and role of youth leadership

    d. Role of youth in peace and Nation building

    e. Any approved indoor / outdoor programs by the Principal

Topic-III :Health, Hygiene and Sanitation and Youth Health   [8]

    a. Definition, Needs and Scope of Health Education

    b. Swachh Bharat Abhiyan

    c. Healthy Lifestyles

    d. HIV, AIDS, Drugs abuse

    e. Any approved indoor / outdoor programs by the Principal

Topic-IV :Environment Issues, Emergencies and Disaster Management   [8]

    a. Environment conservation, enrichment and sustainability

    b. Waste management

    c. Natural resource management [Rain water harvesting and Energy conservation]

    d. Introduction to Disaster Management, Classification of Disasters

    e. Any approved indoor / outdoor programs by the Principal

References:

1. National Service Scheme Manual (Revised) 2006, Government of India, Ministry ofYouth Affairs and Sports, New Delhi.

2. National Youth Policy, Government of India, Ministry of Youth Affairs and Sports, New Delhi.

3. https://nss.gov.in/

NSS/NCC/NSO/YRC&CLUBACTIVITIES

National Sports Organization (NSO)

OBJECTIVES:

    To create awareness about basic fitness and mental strength

    To promote the development of physical fitness

    To develop the sporting activities of the youth

    To create the social responsibilities and social interaction through participation

ACTIVITIES   **5**

INTRODUCTION - Introduction of NSO & Physical Fitness and games Skills Test (1)

PHYSICAL FITNESS ACTIVITIES - Importance of Basic Physical Fitness - BMI Calculation - Identification of deformities,   (2)

SPORTS PRACTICE - Games and fitness activities Physical Fitness Activities (2)

COURSE OUTCOMES:

    Get basic knowledge about physical and mental fitness

    NSO create self-esteem and self confidence

    NSO provide opportunity get social interaction

    Development of character and personality through participation

REFERENCES:

1. www.google.com
2. https://scholar.google.com/
3. https://www.medindia.net/patients/lifestyleandwellness/five-essential-components-of-physical-fitness-references.htm
4. https://pubmed.ncbi.nlm.nih.gov/

தமிழ் மன்றம்

பாடத்திட்டத்தின் நோக்கங்கள்

- மாணவர்களை சிறந்த மேடைப்பேச்சாளர்களாக உருவாக்குவது

- தாய்மொழியின் மேன்மையை பாதுகாப்பது..

பயிற்சித்திட்டம்

1. பேச்சுக்கலைப் பயிற்சி
2. கவிதை மற்றும் கட்டுரைகள் எழுதும் பயிற்சி
3. அறிவியல் பொறியியல் தொழில்நுட்பங்களைத் தமிழில் எழுதுதல்.
4. பட்டிமன்ற மேடைகளில் பேசும் பயிற்சி.
5. நாட்டுப்புறப்பாடல்கள் பாடுதல் மற்றும் கதைகள் எழுதும் பயிற்சி.

கற்றல் முடிவு

1. பேச்சுக்கலைப் தேர்ச்சி
2. நாட்டுப்புறப்பாடல்கள் பற்றிய புரிதல்

மேற்கோள்கள்

https://eegarai.darkbb.com/t63483-topic

https://poriyari.in/

YOUTH RED CROSS – Social Service based activities

OBJECTIVES:

To enhance the societal awareness
To upgrade the Personality

ACTIVITIES 5

1. **HEALTH PROMOTION**- Activities that promotes health (2)

2. **SOCIETAL SERVICE**-Social Service activities(2)

3. **FRIENDSHIP BUILDING** - Friendship building activities between communities (1)

COURSE OUTCOME

1. Enhanced Social Awareness

2. Personality development of the individual

References:
5. IRCS/YRC Handbook
6. https://www.indianredcross.org/youth/Guidelines-for-JYRC-LR.pdf

RESONANCE – SKILL BASED ACTIVITIES

OBJECTIVES:

To know the basics and general principles of Physics.
To provide knowledge of the current trends in Physics.
To develop a solid scientific and technical competence for investigating and applying the relationships of Physics phenomena in various fields of Physics.

ACTIVITIES   **5**

1. **QUIZ** - Basics and general principle (1)

2. **PAPER PRESENTATION** - Current trends (2)

3. **PROJECTS -** Fun with Physics (2)

COURSE OUTCOME

Students were able to:

recollect the general principles of Physics.
to explore the topics in the current trends in Physics.
develop practical expertise in various areas of Physics.

REFERENCES:

1. Principles of Physics, 10Ed, Isv by Robert Resnick Jearl Walker, David Halliday (2015)
2. 'The Feynman Lectures on Physics' (Volume I, II and III) , Matthew Sands, Richard Feynman, and Robert B. Leighton.
3. https://www.science-sparks.com/top-5-physics-experiments-you-can-try-at-home
4. https://www.electronicsforu.com/category/electronics-projects/hardware-diy.

GE3251   **NSS//YRC/NSO/Tamil Mandram/Resonance/Eclectic**   L   T   P   C
Lingua/Maths Association /Fine Arts Club

0   0   1   1#

NSS/NSO/YRC&CLUBACTIVITIES

S.No	Units	Hours
1	NSS	5
2	NSO	5
3	YRC	5
4	English	5
5	Physics	5
6	Chemistry	5
7	Mathematics	5
8	Tamil Mandram	5
9	Fine Arts Club	5

A students would attend class /Lecture/activity/ in each subject.

The student would be assessed for score of 20 each and course outcome.

To give them an exposure to learning Basic Science and humanities.

MA3321 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS LT P C
3 0 0 3

OBJECTIVES:

To introduce the effective mathematical tools for the solutions of partial differential equations.

To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.

Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering.

To acquaint the student with Fourier transform techniques used in wide variety of situations.

To model several physical problems to develop Z transform techniques for discrete time systems.

UNIT-I: PARTIAL DIFFERENTIAL EQUATIONS 9L

Solutions Lagrange's linear equation — linear partial differential equations of second and higher order with constant coefficients of homogeneous type.

UNIT-II: FOURIER SERIES 9L

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Harmonic analysis.

UNIT-III: LAPLACE TRANSFORMS 9L

Existence conditions – Transforms of elementary functions – Basic properties – Inverse transforms – Convolution theorem – Transform of periodic functions.

UNIT-IV: FOURIER TRANSFORMS 9L

Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT-V: Z – TRANSFORMS AND DIFFERENCE EQUATIONS 9L

Z- Transforms – Elementary properties – Inverse Z – transform (using partial fraction and residues) – Solution of difference equations using Z – transform.

TOTAL: 45L PERIODS

OUTCOMES:

Understand the fundamental concept of the concepts of Partial differential Equations.

Understand the basic concepts of mathematical principles on Fourier & Z-transforms.

Laplace transform and inverse transform of simple functions, properties, are studied.

Apply the concept of Understand the concept Fourier series and apply the concept in solving PDE.

Understand the fundamental concept of the concepts of Solution of difference equations

TEXT BOOKS:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.

2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.

3. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S. Viswanathan Publishers Pvt. Ltd.1998.

REFERENCE BOOKS:

1. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics",7th Edition, Laxmi Publications Pvt Ltd, 2007.

2. Ramana.B.V., "Higher Engineering Mathematics",Tata McGraw Hill Publishing Company Limited, NewDelhi, 2008.

3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

4. Erwin Kreyszig,"Advanced Engineering Mathematics", 8th Edition, Wiley India, 2007.5. Ray Wylie. C and Barrett.L.C, "Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.

6. P.Sivaramakrishna Das, C.Vijayakumari, Transforms and Partial Differential Equations, Pearson India Education Services Pvt. Ltd, 2019.

Course Outcomes	PROGRAM OUTCOMES												Program Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
CO2	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
CO3	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
CO4	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
CO5	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
Avg	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-

No Correlation -   Low 1   Medium 2   High 3

EC3362   **SOLID STATE CIRCUITS**   L   T   P   C

                                                                    3   0   0   3

OBJECTIVES:

1. To impart a comprehensive exposure to semiconductor devices.
2. To evaluate the frequency response of small signal amplifiers.
3. To remember and analyze single stage and multistage amplifier circuits.
4. To study about feedback amplifiers and oscillators principles.
5. To understand the analysis and design of power amplifiers.
6. To develop analog application circuits.

UNIT-I: SEMICONDUCTOR DEVICES   9

PN junction diode, Zener diode, BJT, MOSFET, UJT – structure, operation and V-I characteristics, Rectifiers – Half Wave and Full Wave Rectifier, Voltage regulator.

UNIT-II: AMPLIFIERS   9

Load line, operating point, biasing methods for BJT and FET, BJT small signal model and Analysis of CE, CB, CC amplifiers- FET small signal model and Analysis of CS, CG and CD.

UNIT-III: DIFFERENTIAL AMPLIFIER AND MULTISTATE   9
                  AMPLIFIERS

Differential amplifier – Common mode and Difference mode analysis, CMRR, Cascade and Cascode amplifier, Tuned amplifiers – Gain and frequency response – Neutralization methods.

UNIT-IV: FEEDBACK AMPLIFIERS AND OSCILLATORS   9

Advantages of negative feedback – Voltage / Current, Series, Shunt feedback Amplifiers –positive feedback–Condition for oscillations, Phase shift,Hartley, Colpitts and Crystal oscillators.

UNIT-V: **POWER AMPLIFIERS AND DC/DC CONVERTERS**   **9**

Power amplifiers- class A-Class B-Class AB-Class C-Power –DC/DC convertors –
Buck, Boost, Buck-Boost analysis and design.

TOTAL : 45 Periods

COURSE OUTCOMES:

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

1. Explain the structure and operation of basic electronic devices.
2. Analyze frequency response of BJT and FET amplifiers.
3. Evaluate the AC parameter of single stage and multistage amplifiers.
4. Design and analyze feedback amplifiers and oscillator principles.
5. Understand the different power amplifiers and supply circuits.
6. Develop analog application circuits.

TEXTBOOKS:

1. David A. Bell, "Electronic Devices and Circuits", Oxford Higher Education press, 5 th Edition, 2018.and Applications', Pearson Education, 2007.
2. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 10th Edition, Pearson Education / PHI, 2012.
3. Adel .S. Sedra, Kenneth C. Smith, "Micro Electronic Circuits", Oxford University Press, 7 th Edition, 2017.
4. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, 4th Edition, Mc Graw Hill Education (India) Private Ltd., 2017.
5. Christopher, 'Electronic Devices, Circuits, and Applications 'Springer, 2022.

REFERENCE BOOKS:

1. Donald.A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill, 3 rd Edition,2017.
2. D.Schilling and C.Belove, "Electronic Circuits", McGraw Hill, 3 rd Edition, 2002.

3. Jacob Millman and Arvin Grabel, 'Microelectronics', McGraw Hill, 2017.

4. Electronic Devices & Circuits Theory – Robert Boylestad and Louis Nashelsky, 10th EditionPrentice Hall, 2013.

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

COs	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	3	3	2	1	-	-	-	-	-	1	2	1	1	3
CO2	3	2	2	3	2	2	-	-	-	-	-	1	2	1	1	3
CO3	3	3	3	2	1	2	-	-	-	-	-	1	2	1	1	3
CO4	3	3	2	3	2	2	-	-	-	-	-	1	2	1	1	3
CO5	3	2	3	2	2	1	-	-	-	-	-	1	2	1	1	3
CO6	3	3	3	3	2	2	-	-	-	-	-	1	2	1	1	3
Avg	3	3	3	3	2	2	-	-	-	-	-	1	2	1	1	3

EC3363   **SIGNALS AND SYSTEMS**   L   T   P   C

                                                      3   0   0   3

OBJECTIVES:

To understand the basic properties of Signals and Systems.

To explore the Fourier transform and Laplace transform in continuous time signal analysis.

To analyze continuous time LTI systems using Fourier and Laplace transforms.

To apply DTFT and Z-transform in Discrete time signal analysis.

To analyze the discrete time LTI systems using DTFT and Z transform.

To examine the convolution operation for continuous and discrete time systems.

UNIT-I: CLASSIFICATION OF SIGNALS AND SYSTEMS   9

Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids -Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - Classification of systems- CT systems and DT systems- – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable.

UNIT-II: ANALYSIS OF CONTINUOUS TIME SIGNALS   9

Fourier series for periodic signals - Fourier Transform – Inverse Fourier Transform - properties- Laplace Transforms – Inverse Laplace Transform - and properties.

UNIT-III: LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS   9

Impulse response - convolution integrals- Differential Equation- Fourier and Laplace transforms in Analysis of CT systems - Systems connected in series / parallel.

UNIT-IV: ANALYSIS OF DISCRETE TIME SIGNALS   9

Baseband signal Sampling – Fourier Transform of discrete time signals (DTFT) - Inverse DTFT- Properties of DTFT - Z Transform Inverse Z Transform - & Properties.

UNIT-V: LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS   9

Impulse response – Convolution sum - Difference equations- - Discrete Fourier Transform and Z Transform Analysis of Recursive & Non-Recursive systems-DT systems connected in series and parallel.

TOTAL : 45 Periods

COURSE OUTCOMES:

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

- Emphasize the basic properties of signals and systems used for signal processing
- Characterize the continuous time signal using Fourier and Laplace transform.
- Analyze the continuous time LTI systems using Fourier and Laplace transforms.
- Compute the output of a discrete time LTI system in the time and frequency domains.
- Estimate the DTFT and Z transform in discrete time signal analysis.
- Understand the principles of convolution for continuous and discrete time systems.

TEXT BOOKS:

1.Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, 2015.

2. B. P. Lathi, "Principles of Linear Systems and Signals", Second Edition, Oxford, 2009.

REFERENCE BOOKS:

1. R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007.

2. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.

3. Simon Haykin, Barry Van Veen, "Signals and Systems", John Wiley & Sons, Inc, Second Edition, 2007.

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

COs	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	-	3	-	3	2	-	-	-	-	-	3	-	-	1	-
CO2	3	-	3	-	-	2	-	-	-	-	-	3	-	3	-	-
CO3	3	3	-	-	3	2	-	-	-	-	-	3	2	-	-	-
CO4	3	3	-	-	3	2	-	-	-	-	-	3	-	3	1	-
CO5	3	3	3	3	3	2	-	-	-	-	-	3	-	3	1	-
CO6	3	3	3	3	-	2	-	-	-	-	-	3	2	3	1	-
Avg	3	3	3	3	3	2	-	-	-	-	-	3	2	3	1	-

EE3363   **ELECTRIC CIRCUIT ANALYSIS**   **L T P C**

                            3 0 0 3

COURSE OBJECTIVES

1. To introduce electric circuits and its analysis
2. To impart knowledge on solving circuit equations using network theorems
3. To educate the transient response of circuits.
4. To introduce the phenomenon of resonance in coupled circuits.
5. To introduce Phasor diagrams and analysis of single &three phase circuits

UNIT-I   BASIC CIRCUITS ANALYSIS   9

Ohm's Law -Kirchhoff 's Laws – DC Circuits – Resistors in series and parallel circuits - A.C Circuits – Average and RMS Value –Complex Impedance – Phasor diagram - Real and Reactive Power, Power Factor, Energy -Mesh current and node voltage methods of analysis D.C and A.C Circuits

UNIT-II   NETWORK REDUCTION AND THEOREMS FOR DC AND AC CIRCUITS

                                   9

Network reduction: voltage and current division, source transformation – star delta conversion. Theorems – Superposition, Thevenin's and Norton's Theorem – Maximum power transfer theorem –Reciprocity Theorem – Millman's theorem.

UNIT-III   TRANSIENT RESPONSE ANALYSIS   9

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input –Characterization of two port networks in terms of Z, Y and h parameters.

UNIT-IV   **THREE PHASE CIRCUITS**   **9**

Three phase balanced / unbalanced voltage sources –analysis of three phase 3-wire and 4-wirecircuits with star and delta connected loads, balanced &un balanced –phasor diagram of voltages and currents –power and power factor measurements in three phase circuits.

UNIT-V   **RESONANCE AND COUPLED CIRCUITS**   **9**

Series and parallel resonance –frequency response – Quality factor and Bandwidth – Self and mutual inductance – Coefficient of coupling Analysis of coupled circuits– Single Tuned circuits.

TOTAL: 45 PERIODS

COURSE OUTCOMES

1. To acquire knowledge on Ohm's Law and Kirchhoff 's laws.
2. Ability to determine behavior of the DC and AC circuit by using mesh analysis/ nodal analysis / network theorems
3. Ability to Compute the transient response of first order and second order systems to step and sinusoidal input.
4. To acquire knowledge on line/ phase voltage and currents of the three-phase circuit
5. To understand the concepts of the frequency response of series and parallel RLC circuits

TEXTBOOKS

1. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, 9thedition, New Delhi, 2020.
2. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2019.
3. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.

REFERENCE BOOKS

1. Chakrabarti A, "Circuits Theory (Analysis and synthesis), Dhanpat Rai & Sons, New Delhi, 2020.

2. Joseph A. Edminister, Mahmood Nahvi, "Electric circuits", Schaum's series, McGraw-Hill,First Edition, 2019.

3. M E Van Valkenburg, "Network Analysis", Prentice-Hall of India Pvt Ltd, New Delhi, 2015.

4. Richard C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley Sons, Inc. 2018.

5. Sudhakar A and Shyam Mohan SP, "Circuits and Networks Analysis and Synthesis", McGraHill , 2015.

CO - PO and CO - PSO MAPPING

	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	1	1									3		1		2	
CO2	1		1	2								3	1			
CO3	1		1		2			3					1		2	3
CO4	1	1	1								3	1	1	1		
CO5	1	1			2								1			3
Avg	1	1	1	2	2			3			3	2	1	1	2	3

EC3365	**ELECTROMAGNETIC FIELDS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

To gain conceptual and basic mathematical understanding of vector analysis on fields.

To impart knowledge on the basics of static electric field and the associated laws.

To impart knowledge on the basics of static magnetic field and the associated laws

To study the significance of Time varying fields.

To understand the behaviour of the propagation of EM waves.

To solve problems based on the electromagnetic fields and waves.

UNIT- I: INTRODUCTION   9

Electromagnetic model, Units and constants, Vector algebra, Orthogonal coordinate systems and transformations: Cartesian, cylindrical and spherical coordinates, Line, surface and volume integrals, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stoke's theorem, Laplacian of a Scalar, Null identities, Helmholtz's theorem.

UNIT- II: ELECTROSTATIC FIELD   9

Coulombs law, Electric field intensity, Gauss's law and applications, Electric scalar potential, Conductors in static electric field, Dielectrics in static electric field, Electric flux density, dielectric constant and dielectric strength, Boundary conditions for electrostatic fields, Capacitance, Parallel plate, Cylindrical and spherical capacitors, Electrostatic shielding, Electrostatic energy and forces, Poisson's and Laplace's equations, Uniqueness theorem, Current density and Ohm's law, Electromotive force and Kirchhoff's voltage law, Continuity equation and Kirchhoff's current law.

UNIT- III: MAGNETOSTATIC FIELD   9

Lorentz force equation, Biot-Savart law and applications, Ampere's circuital law and applications, Vector magnetic potential, Gauss law for magnetic fields, Magnetic flux Density and Field intensity, Magnetization and permeability, Magnetic forces,

Torque and Magnetic moment, Classification of magnetic materials, Boundary conditions for magnetostatic fields, Magnetic circuits, Magnetic energy, Inductance, self-inductance, mutual inductance, inductance of solenoid, toroid and coaxial cable.

UNIT- IV: TIME-VARYING FIELDS AND MAXWELL's EQUATIONS   9

Faraday's law, Transformer and Motional Electromotive Forces, Displacement current, Maxwell's equations in integral and differential form, Potential functions, Electromagnetic boundary conditions, Wave equations and their solutions, Time-Varying Potentials, Time-harmonic fields, Poynting theorem and Electromagnetic power flow.

UNIT- V: UNIFORM PLANE WAVES   9

Uniform Plane wave propagation in free space, dielectrics and good conductors. Group velocity, Wave polarization, Normal incidence and Oblique incidence at a plane conducting boundary, Normal incidence and Oblique incidence at a plane dielectric boundary.

TOTAL : 45 Periods

COURSE OUTCOMES:

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

Relate the fundamentals of vector, coordinate system to electromagnetic concepts.

Analyze the concepts and characteristics of Electrostatic field in material space and solve the boundary conditions.

Illustrate the concepts and characteristics of Magnetostatic field in material space and solve the boundary conditions.

Determine the significance of time varying fields.

Apply EM laws for the propagation of plane waves through different medium.

Explain the applications of electromagnetic fields and waves.

TEXTBOOKS:

1. David. K.Cheng, "Field and wave Electromagnetics", Second revised edition, Pearson education, 2013.

2. W.H.Hayt and A.Buck, "Engineering Electro Magnetics", Eighth Edition, Mc Graw Hill, 2012.

REFERENCE BOOKS:

1. Mathew.N.O.Sadiku, "Elements of Electromagnetics", Sixth edition, Oxford University Press, 2015.
2. John D Kraus and Daniel A Fleisch, "Electromagnetics with Applications", Fifth edition, Mc Graw Hill, 2010.
3. Edward C. Jordan & Keith G. Balmain, "Electromagnetic waves and Radiating Systems", Second Edition, Prentice-Hall Electrical Engineering Series, 2012.
4. Branislav M.Notaros, "Electromagnetics" Pearson education, 2012.
5. Bhag Singh Guru & Huseyin R. Hiziroglu, "Electromagnetic Field Theory Fundamentals", Second edition, Cambridge University press, 2009.

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	1	-	-	-	-	1	-	1	-	2	2	1	2	-
CO2	3	2	1	2	-	-	-	1	-	1	-	1	2	1	-	-
CO3	3	2	1	2	-	-	-	1	-	1	-	1	2	1	-	-
CO4	2	2	1	-	-	-	-	1	-	1	-	2	2	1	2	-
CO5	3	2	1	2	-	-	-	2	-	1	-	2	2	1	1	-
CO6	2	2	1	2	-	-	-	2	-	1	-	2	2	1	1	-
Avg	3	2	1	2	-	-	-	1	-	1	-	2	2	1	2	-

EC3366	DIGITAL SYSTEMS DESIGN	L	T	P	C
		3	0	2	4

OBJECTIVES:

1. To understand the Digital fundamentals, Boolean algebra and its applications in digital systems.
2. To Practice with the design of combinational digital circuits using logic gates.
3. To bring out the analysis and design procedures for synchronous sequential circuits.
4. To explore the design procedures of an asynchronous sequential circuits.
5. To introduce semiconductor memories and related technology.
6. To design combinational and sequential circuits using HDL.

UNIT-I: DIGITAL FUNDAMENTALS   9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map and Quine-McCluskey methods.

UNIT-II: COMBINATIONAL CIRCUIT DESIGN   9

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Decoder, Encoder, Priority Encoder, Magnitude Comparator, Case study: 8 bit Arithmetic and logic unit.

UNIT-III: SYNCHRONOUS & ASYNHRONOUS SEQUENTIAL   9
CIRCUITS

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

UNIT-IV: ASYNHRONOUS SEQUENTIAL CIRCUITS   9

Stable and Unstable states, output specifications, Pulse mode sequential circuits, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Design of Hazard free circuits.

**UNIT-V: MEMORY DEVICES AND INTRODUCTION TO HDL   9
              PROGRAMMING**

Basic memory structure- ROM-PROM-EPROM-EEPROM-EAPROM, RAM – Static and Dynamic RAM- Programmable Logic Devices-Programmable Logic Array (PLA) – Programmable Array Logic (PAL). Introduction to HDL: Behavioral – data flow, and algorithmic and structural description, Examples for Combinational and Sequential circuits-Adders-Multiplexer-demultiplexer-Encoder-Decoder-Flipflops-Shift registers.

**   45 PERIODS**
PRACTICAL EXERCISES: 30 PERIODS

1.Design of adders and subtractors & code converters.
2. Design of Multiplexers & Demultiplexers.
3. Design of Encoders and Decoders.
4. Design of Magnitude Comparators.
5. Design and implementation of counters using flip-flops.
6. Design and implementation of shift registers.

**   TOTAL:75 PERIODS**

COURSE OUTCOMES:

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

1. Use Boolean algebra and simplification procedures relevant to digital logic.
2. Apply the logical knowledge in the design of combinational circuits.
3. Analyze the concepts of sequential circuits and design sequential circuits in terms of state machines.
4. Design and analyze asynchronous sequential circuits.
5. Build logic gates and use programmable devices.
6. Implement combinational and sequential circuits using HDL.

TEXTBOOKS:

1. M. Morris Mano and Michael D. Ciletti, "Digital Design", 5th Edition, Pearson, 2014.

2. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.

3. Samir Palnitkar – "Verilog HDL A guide to Digital design and Synthesis", 2nd Edition, Prentice Hall, 2003.

REFERENCE BOOKS:

1. S.Salivahanan and S.Arivazhagan "Digital Electronics", First Edition, Vikas Publishing House pvt. Ltd., 2012.

2. Thomas L. Floyd, "Digital Fundamentals", 10 Edition, Pearson Education Inc, 2011.

3. Anil K.Maini, "Digital Electronics", Wiley, 2014

4. A.Anand Kumar "Fundamentals of Digital Circuits", 4th Edition, PHI Learning Private Limited, 2016.

5. Soumitra Kumar Mandal, "Digital Electronics", McGraw Hill Education Private Limited, 2016.

6. Nazeih M.Botros "HDL programming VHDL and Verilog", Dreamtech Press, Reprint Edition 2009.

WEB REFERENCES:

1. https://nptel.ac.in/courses/117103064
2. https://nptel.ac.in/courses/108103179

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	2	2	-	-	2	-	-	2	1	3	3	3	2	-	1
2	2	3	3	2	2	2	-	-	2	2	2	1	2	2	2	2
3	2	3	3	3	2	-	-	-	2	2	2	2	2	2	2	2
4	2	3	3	3	2	-	-	-	2	2	2	2	2	2	2	2
5	2	2	1	1	2	2	-	-	2	1	2	2	2	2	3	1
6	2	3	3	2	3	-	-	-	2	2	2	2	2	1	3	2
Avg	2	3	3	2	2	2	-	-	2	2	2	2	2	2	2	2

EC3367 **ELECTRONICS CIRCUITS DESIGN LABORATORY**

L	T	P	C
0	0	3	1.5

OBJECTIVES:

1. To learn the characteristics of PN Junction diode.

2. To learn the characteristics of Zener diode.

3. To understand the operation of rectifiers and filters.

4. To study and Testing of BJT and FET amplifiers.

5. To Design of Operation of power amplifiers.

6. To applying knowledge develop an analog application circuits.

LIST OF EXPERIMENTS

1 Characteristics of PN Junction Diode and Zener diode
2 Full Wave Rectifier with Filters.
3 Design of Zener diode Regulator
4 BJT Common Emitter input-output Characteristics.
5 FET Drain current and Transfer Characteristics.
6 Frequency response of CE and CS amplifiers.
7 Frequency response of CC and CD amplifiers
8 Frequency response of Cascade Amplifier.
9 CMRR measurement of Differential Amplifier.
10 Class A Power Amplifier.
11 Class C Power Amplifier.

TOTAL: 45 Periods

COURSE OUTCOMES:

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

1. Study the characteristics of PN Junction Diode.

2. Understand the operation of Zener diode.

3. Design and Testing Full Wave Rectifier with Filters.

4. Evaluate AC parameter of BJT and FET amplifiers.

5. Illustrate the Operation of power amplifiers.

6. Develop an analog application circuits.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:	
1	CRO/DSO (30 MHz) – 15 Nos.
2	Signal Generators / Function Generators (3 MHz) – 15 Nos.
3	Dual Regulated Power Supplies (0-30 v) - 15 Nos.
4	Bread Boards - 15 Nos.
5	Bread Boards - 15 Nos.
6	SPICE Simulator

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

COs	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	2	3	2	1	-	-	3	-	-	2	2	1	1	2
CO2	3	3	2	3	2	1	-	-	3	-	-	2	2	1	1	2
CO3	3	2	2	3	1	1	-	2	3	-	-	2	3	2	2	2
CO4	3	3	2	3	3	2	2	2	3	-	-	2	3	2	2	2
CO5	3	2	2	3	2	2	2	2	3	-	-	2	3	2	2	2
CO6	3	2	3	3	3	2	2	2	3	3	2	2	3	3	3	3
Avg	3	3	2	3	2	2	2	2	3	3	2	2	3	2	2	2

EE3369   CIRCUIT THEORY AND ELECTRONIC DEVICES LABORATORY   L T P C

0 0 3 3

COURSE OBJECTIVES:

To impart knowledge on the following topics

1. To gain hands on experience in Kirchhoff's laws.
2. To gain knowledge on basic circuit theorems
3. To learn the characteristics of basic electronic devices such as Diode.
4. To learn the characteristics of BJT,FET,SCR.
5. To learn the characteristics Full wave and Half wave rectifier using Pspice.

LIST OF EXPERIMENTS:

1. Experimental verification of electrical circuit problems using Kirchhoff's voltage and current laws.
2. Experimental verification of electrical circuit problems using Thevenin's theorem.
3. Experimental verification of electrical circuit problems using Norton's theorem.
4. Experimental verification of electrical circuit problems using Superposition theorem.
5. Experimental verification of Maximum Power transfer Theorem.
6. V-I Characteristics of PN Junction Diode.
7. V-I Characteristics of Zener diode.
8. Experimental verification of Common Emitter input-output Characteristics.
9. Verification of Input and Output Characteristics Common Base Configuration using Pspice.
10. Experimental verification of FET Characteristics.
11. Experimental verification of SCR Characteristics.
12. Half wave Rectifier and Full wave Rectifier using Pspice.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

1.	Regulated Power Supply 0 – 15 V D.C	10
2.	BC 107, BC 148, 2N2646, BFW10	10
3.	1N4007, Zener diodes	10
4.	Oscilloscope (20 MHz)	10
5.	PC	10
6.	Circuit Simulation Software (e-Sim/ Scilab/ Pspice / MATLAB / other Equivalent software Package)	Min.10 users
7.	Printer	1
8.	AC/DC - Voltmeters	10
9.	Ammeters	10
10.	Multi-meters	10
11.	Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box	6.nos each
12.	Circuit Connection Boards	10
13.	Resistors, Inductors, Capacitors of various capacities	As Required

TOTAL: 60

PERIODS COURSE OUTCOMES:

CO1.　　Ability to Understand and Kirchhoff's laws
CO2.　　Ability to understand the basic circuit theorems.
CO3.　　Ability to understand basic electronic devices such as Diode.
CO4.　　Ability to understand concept of BJT,FET,SCR.
CO5.　　Ability to concept characteristics Full wave and Half wave rectifier using Pspice.

REFERENCES:

R1.　　Laboratory Manual

1905307	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	1					1	2		2	2	3			2
CO2	3	3	2	2				1	2		2	2	2	2		2
CO3	3	3	2	2				1	2		2	2	2	2		2
CO4	3	3	3	1				1	2		2	2	3			2
CO5	3	3	1	2	3			1	2		2	2	2	2		2
Avg	3	3	2	2	3	-	-	1	2	-	2	2	2	2	-	2

MA3424   **APPLIED MATHEMATICS FOR ELECTRONICS AND**
                    COMMUNICATION ENGINEERING   **L T P C**
                                                          2 0 0 2

OBJECTIVES:

To understand the basic concepts of one dimensional random variables and special probability distribution

To understand the basic concepts of two dimensional random variables correlation and linear regression

To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.

To understand the concept of correlation and spectral densities.

To introduce the basic notions of linear system with random inputs

UNIT-I: RANDOM VARIABLES & DISTRIBUTIONS   6L

Discrete and continuous random variables - Two dimensional random variables-Joint probability distributions – Marginal and conditional distributions.

UNIT-II: TWO DIMENSIONAL RANDOM VARIABLES   6L

Two dimensional random variables Joint distributions – Marginal and conditional distributions – correlation- Regression

UNIT-III: RANDOM PROCESSES   6L

Classification – Stationary process – Markov chain- Poisson process.

UNIT-IV: CORRELATION AND SPECTRAL DENSITIES   6L

Auto correlation function - Properties –Power spectral density-Properties.

 UNIT-V: LINEAR SYSTEM WITH RANDOM INPUTS   6L

Linear time invariant system-System transfer function-Auto correlation and cross correlation functions of input and output.

                                              TOTAL: 30L PERIODS

OUTCOMES:

Understand the basic concepts of one dimensional random variables and probability distributions apply them to model engineering problems.

Understand the basic concepts of two dimensional random variables and correlation regression and apply them to model engineering problems

Apply the concept of random processes in engineering disciplines.

Understand and apply the concept of correlation and spectral densities.

Apply the concepts of random processes in linear system with random input

TEXT BOOKS:

1. Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier,1st Indian Reprint, 2007.

2. Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.

3. T.Veerarajan, Probability, Statistics and Random processes, Tata McGraw-Hill, 5th Edition,2008

REFERENCE BOOKS:

1. Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004.

2. Yates, R.D. and Goodman. D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.

3. Gross, D., Shortle, J.F, Thompson, J.M and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student 4th Edition, 2014

4. J.Medhi, Stochastic Processes, New Age International (P) Ltd., Second Edition, 1994.

5. P. Sivaramakrishna Das, C. Vijayakumari, " Probability and Random Processes", Pearson Publications,2nd Edition 2016

Course Outcomes	PROGRAM OUTCOMES												Program Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	3	2	1	-	-	-	-	-	1	1	1	-	-	-
CO2	3	3	3	2	1	-	-	-	-	-	1	1	1	-	-	-
CO3	3	3	3	2	1	-	-	-	-	-	1	1	1	-	-	-
CO4	3	3	3	2	1	-	-	-	-	-	1	1	1	-	-	-
CO5	3	3	3	2	1	-	-	-	-	-	1	1	1	-	-	-
Avg	3	3	3	2	1	-	-	-	-	-	1	1	1	-	-	-

No Correlation -   Low 1   Medium 2   High 3

EC3462   **LINEAR INTEGRATED CIRCUITS**   L   T   P   C

                                                            3   0   0   3

OBJECTIVES:

1. To learn IC classification, basic building blocks and characteristics of linear integrated circuits.
2. To study and design Instrumentation amplifier and wave shaping Circuits.
3. To Classify and design the linear and non-linear applications of operational amplifiers.
4. To introduce the theory and applications of analog multipliers, PLL and VCO.
5. To illustrate the functions of ADC and DAC.
6. To infer the concepts of waveform generation and introduce some special function ICs.

UNIT-I: BASICS OF IC AND OPERATIONAL AMPLIFIERS   9

IC classification, fundamentals of monolithic IC technology, Realization of monolithic ICs and packaging. Current mirror and current sources, Current sources as active loads, Ideal Operational Amplifier Characteristics - operational amplifier stages. DC and AC performance characteristics of Op-Amp, Open and closed loop configurations.

UNIT-II: APPLICATIONS OF OPERATIONAL AMPLIFIERS   9

Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Comparators, Multivibrator, Schmitt trigger, clipper and clamper, Low and high pass filters.

UNIT-III: ANALOG MULTIPLIER AND PLL   9

Analog Multiplier using Emitter Coupled Transistor Pair, analog multiplier ICs and their applications, Operation of the basic PLL, closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL.

UNIT-IV: **ANALOG TO DIGITAL AND DIGITAL TO ANALOG**   **9**

                   CONVERTERS

D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R - 2R Ladder types, high speed sample-and-hold circuits, A/D Converters – specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type.

UNIT-V: **WAVEFORM GENERATORS AND SPECIAL FUNCTION ICS**   **9**

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, IC555 Timer, IC Voltage regulators, IC 723 general purpose regulator, Frequency to Voltage and Voltage to Frequency converters, Isolation Amplifier.

TOTAL : 45 Periods

COURSE OUTCOMES:

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

1. Understand IC classification, IC technology and Realization of monolithic ICs
2. Describe the DC and AC characteristics of operational amplifiers and its effect on output and their compensation techniques.
3. Design operational amplifier circuits for linear and non-linear applications.
4. Explain the working and applications of timer, VCO and PLL ICs.
5. Choose appropriate A/D and D/A converters for signal processing applications.
6. Illustrate the function of application specific ICs such as Voltage regulators and Isolation Amplifier.

TEXTBOOKS:

1. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2018, Fifth Edition. (Unit I – V).
2. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", 4th Edition, Tata Mc Graw-Hill, 2016 (Unit I – V).

REFERENCE BOOKS:

1. Ramakant A. Gayakwad, "OP-AMP and Linear ICs", 4th Edition, Prentice Hall Pearson Education, 2015.

2. Robert F.Coughlin, Frederick F.Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth Edition, PHI, 2001.

3. S.Salivahanan & V.S. Kanchana Bhaskaran, "Linear Integrated Circuits", TMH,2nd Edition, 4th Reprint, 2016.

4. Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", 5th Wiley International, 5th Edition, 2009.

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

CO's	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	3	3	3	2	-	-	-	-	1	2	2	1	1	1
CO2	3	2	2	3	2	1	-	-	-	-	1	2	2	1	1	1
CO3	3	2	3	2	2	2	-	-	-	-	1	1	2	1	1	1
CO4	3	2	2	2	3	1	-	-	-	-	1	1	2	1	1	1
CO5	2	2	3	2	3	2	-	-	-	-	1	1	2	1	1	1
CO6	2	2	2	2	2	2	-	-	-	-	1	1	2	1	1	1
Avg	3	2	3	2	3	2	-	-	-	-	1	1	2	1	1	1

EC3463   **COMMUNICATION SYSTEMS**   L   T   P   C

                                                                3   0   0   3

OBJECTIVES:

1. To explore the aspects of communication and its effects
2. To introduce the concepts of amplitude modulation.
3. To discuss angle modulation and their spectral characteristics.
4. To understand the properties of random process
5. To know the effect of noise on communication systems.
6. To study the concepts of pulse analog modulation.

UNIT-I: AMPLITUDE MODULATION   9

Amplitude Modulation- DSBSC, DSBFC, SSB, VSB - Modulation index, Spectra, Power relations and Bandwidth – AM Generation – Square law and Switching modulator, DSBSC Generation – Balanced and Ring Modulator, SSB Generation – Filter, Phase Shift and Third Methods – Comparison of different AM techniques, Super heterodyne Receiver.

UNIT-II: ANGLE MODULATION   9

Phase and frequency modulation, Narrow Band and Wide band FM – Modulation index, Spectra, Power relations and Transmission Bandwidth - FM modulation – Direct and Indirect methods, FM Demodulation –Foster Seeley FM discriminator– FM receiver.

UNIT-III: RANDOM PROCESS   9

Random variables, Random Process, Stationary Processes, Mean, Correlation & Covariance functions, Power Spectral Density, Ergodic Processes, Gaussian Process, Transmission of a Random Process Through a LTI filter.

UNIT-IV: NOISE CHARACTERIZATION   9

Noise sources – Noise figure, Noise temperature and Noise bandwidth – Noise in cascaded systems. Representation of Narrow band noise –In-phase and

quadrature, Envelope and Phase – Noise performance analysis in FM systems – Threshold effect, Capture effect, Pre-emphasis and de-emphasis for FM.

UNIT-V: PULSE ANALOG MODULATION 9

Low pass sampling – Aliasing- Signal Reconstruction-Quantization - Uniform & non-uniform quantization - Quantization noise - Companding –PAM, PPM, PWM– TDM, FDM.

TOTAL : 45 Periods

COURSE OUTCOMES:

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

1. Discuss the nature and scope of communication
2. Identify the fundamental concepts and components of amplitude modulation.
3. Design angle modulated communication systems.
4. Emphasize the basic concepts of Random Process to the design of Communication systems.
5. Estimate the noise performance of AM and FM systems.
6. Understand the importance of sampling and quantization in communication systems.

TEXTBOOKS:

1. George Kennedy, Bernard Davis, USA S R M Prasanna, Electronic Communication Systems, McGraw Hill Education; Sixth edition, 2017.
2. Wayner Tomasi, Electronic Communication System, 5th Edition, Pearson Education, 2008.
3. J.G. Proakis, M.Salehi, "Fundamentals of Communication Systems", Pearson Education 2014.
4. Simon Haykins," Communication Systems", Wiley, 5th Edition, 2009.

REFERENCE BOOKS:

1. B.P. Lathi, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2011.

2. D.Roody, J.Coolen, Electronic Communications, 4th edition PHI 2006.

3. H P Hsu, Schaum Outline Series - "Analog and Digital Communications" TMH 2006.

4. Couch.L, "Modern Communication Systems", Pearson, 2001.

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	2	2	1	1	-	1	-	-	-	-	2	2	2	3	-	3
2	3	3	2	2	-	1	-	-	-	-	-	3	3	3	2	1
3	1	2	3	2	-	-	-	-	-	-	-	3	1	2	2	-
4	3	3	2	3	-	-	-	-	-	-	-	3	3	-	-	-
5	1	2	2	2	-	-	-	-	-	-	-	2	1	-	2	-
6	-	1	-	2	-	-	-	-	-	-	2	3	-	1	-	-
Avg	2	2	2	2	-	1	-	-	-	-	2	3	2	2	2	2

EC3464   MICROPROCESSORS, MICROCONTROLLERS AND   L T P C
                                   INTERFACING   3 0 0 3

OBJECTIVES:

1. To understand the Architecture of 8086 microprocessor.
2. To study about multiprocessor configurations and bus structure.
3. To learn the design aspects of I/O and Memory Interfacing circuits.
4. To interface microprocessors with supporting chips.
5. To study the Architecture of 8051 microcontroller.
6. To design a PIC microcontroller based system for application specific solution.

UNIT-I: THE 8086 MICROPROCESSOR   9

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines.

UNIT-II: 8086 SYSTEM BUS STRUCTURE   9

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming –System bus structure, Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.

UNIT-III: PERIPHERALS AND INTERFACING   9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface –- Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications.

UNIT-IV: 8051 MICROCONTROLLER & INTERFACING   9

Architecture of 8051 – Special Function Registers (SFRs) - Instruction set - Addressing modes – Times - Serial Port – Interrupts - Assembly language programming. LCD & Keyboard Interfacing - Sensor Interfacing - External Memory Interfacing- Stepper Motor Interfacing.

UNIT-V: PIC MICROCONTROLLER & INTERFACING 9

PIC Microcontroller - Features and Architecture, Classification of Instructions, PIC18 Programming in C, Timer, Serial Port and Interrupt, PIC18 Interfacing: ADC, DAC, and Sensor.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

1. Acquire the knowledge on architectural concepts of 8086 microprocessor
2. Understand bus interfacing systems and analyze the Coupled communication systems.
3. Explore and design the interface of I/O circuits.
4. Design the interfacing applications with microprocessor.
5. Formulate and implement 8051 microcontroller based systems.
6. Develop new systems based on PIC microcontroller.

TEXT BOOKS:

1. Yu-Cheng Liu, Glenn A.Gibson, ―Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design‖, Second Edition, Prentice Hall of India, 2007. (UNIT I- III)
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, ―The 8051 Microcontroller and Embedded Systems: Using Assembly and C‖, Second Edition, Pearson education, 2011. (UNIT IV)
3. Muhammad Ali Mazidi, Rolind D. Mckinlay and Danny Causey. "PIC Microcontroller and Embedded Systems", Pearson Education, 2008. (UNIT V)

REFERENCES:

1. Doughlas V.Hall, ―Microprocessors and Interfacing, Programming and Hardware‖,TMH,2012
2. A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3rd edition, Tata McGrawHill, 2012

3. Krishna Kant, "Microprocessor and Microcontrollers", Eastern Company Edition, Prentice Hall of India, New Delhi, 2007.

4. Soumitra Kumar Mandal, "Microprocessor and Microcontroller Architecture, Programming and Interfacing using 8085, 8086, 8051", Kindle Edition, McGraw Hill Edu, 2013.

5. Sunil Mathur & Jeebananda Panda, "Microprocessor and Microcontrollers", PHI Learning Pvt., Ltd., 2016.

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	2	1	2	1	3	1	-	2	-	-	-	2	2	1	3	-
2	2	2	2	1	-	-	-	2	-	-	-	2	2	1	3	-
3	2	1	2	1	3	1	-	2	-	-	-	2	2	1	3	-
4	2	1	2	1	3	1	-	2	-	-	-	2	2	1	3	1
5	2	1	2	3	3	1	-	2	-	-	2	2	2	1	3	2
6	2	1	2	3	3	1	-	2	-	-	3	2	2	1	3	3
Avg	2	1	2	2	3	1	-	2	-	-	3	2	2	1	3	2

EI3464　　　　　　**CONTROL SYSTEMS**　　　　L　T　P　C
　　　　　　　　　　　　　　　　　　　　　　　　　　　　3　0　0　3

COURSE OBJECTIVES

1. To understand the use of transfer function models for analysis physical systems and introduce the control system components.
2. To provide adequate knowledge in the time response of systems and steady state error analysis.
3. To accord basic knowledge in obtaining the open loop and closed– loop frequency responses of systems.
4. To introduce stability analysis for systems design of Compensator.
5. State variable representation of physical systems.

UNIT I　　　SYSTEMS AND REPRESENTATION　　　　　　　　9

Basic elements in control systems: – Open and closed loop systems – Electrical analogy of mechanical system– Transfer function – AC and DC servomotors - Synchro – Block diagram reduction techniques – Signal flow graphs.

UNIT II　　　TIME RESPONSE　　　　　　　　　　　　　9

Time response: – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error –Effects of P, PI, PID modes of feedback control –Time response analysis.

UNIT III　　　FREQUENCY RESPONSE　　　　　　　　　　9

Frequency response: – Bode plot – Polar plot – Determination of closed loop response from open loop response - Correlation between frequency domain and time domain specifications.

UNIT IV　　　STABILITY　　　　　　　　　　　　　　　9

Characteristics equation – Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of pole, zero addition – Gain margin and phase margin – Nyquist stability criterion. Design of Compensators using Bode plots.

UNIT V STATE VARIABLE ANALYSIS 9

Concept of state variables – State models for linear and time invariant Systems – Solution of state and output equation in controllable canonical form – Concepts of controllability and observability.

TOTAL : 45 PERIODS

COURSE OUTCOMES

1. To represent and develop systems in different forms using the knowledge gained.
2. To analyses the system in time and frequency domain.
3. To discuss the effect of PID controller in closed loop systems.
4. To analyses the stability of physical systems and construct compensator for the linear systems.
5. Ability to design State variable representation of physical systems.

TEXT BOOKS:

1. I.J. Nagrath and M. Gopal, 'Control Systems Engineering', New Age International Publishers, 2021.
2. Benjamin C. Kuo, " Automatic Control systems", Wiley,2014.
3. NagoorKaniA,"Control Systems Engineering", CBS Publishers and distributors, 2017.

REFERENCES:

1. M.Gopal, "Control System: Principle and design", McGraw Hill Education,2012.
2. Katsuhiko Ogata, "Modern Control Engineering", Pearson, 2015.
3. Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi, 2007.
4. Samarajit Ghosh, Control systems, Pearson Education, New Delhi, 2017.

MAPPING OF COs WITH POs AND PSOs

CO	PO												PSO			
	1	2		1	2		1	2		1	2		1	2		1
1	3	3	3	3	-	-	-	3	-	3	-	1	1	-	-	2
2	3	3	3	2	-	-	-	3	-	3	-	1	2	-	-	3
3	2	1	2	1	-	-	-	2	-	2	-	1	1	-	-	1
4	3	3	3	2	-	-	-	3	-	3	-	1	2	-	-	2
5	3	3	3	3	-	-	-	3	-	3	-	1	1	-	-	1
Avg.	3	3	1	2	-	-	-	3	-	3	-	1	1	-	-	2

GE 3451   **NCC Credit Course Level - I**   **L T P C**
                               (Common to Army, Navy & Air)   3 0 0 3

Objective:
1. To know the basic structure of NCC and Role of NCC
2. To improve the cadet's personality skill and leadership quality
3. To make the interest of cadets to involve in social activities
4. Preventing the potential damage and suffering
5. to destruction of the enemy's ability to fight and will to fight

Unit I   Introduction to NCC   9

Aims, Objectives & Organization of NCC, Incentives, Duties of NCC Cadet, NCC Camps and Types National Integration: Importance & Necessity, Factors Affecting National Integration, Unity in Diversity & Role of NCC in Nation Building, Threats to National Security.

Unit II   Personality Development   9

Personal Transformation, Personal Productivity Skills - time management, organizational and planning skills, problem solving and decision-making abilities, basics of psychology, Leadership, Meditation

Unit III   Social Service and Community Development   9

Basics, Rural Development Programmes, NGOs, Contribution of Youth, Protection of Children and Women Safety, Road / Rail Travel Safety, New Initiatives, Cyber and Mobile Security Awareness

Unit IV   Disaster Managements and its Awareness   9

Importance of Hazards and Disaster, Types of disasters, Earthquakes and its types, flood types and its management, landside and its managements case studies of disasters in Sikkim, Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management

Unit V   War and Peace in Contemporary World   9

Conceptual framework of War and Peace, Concepts of theories and approaches, Modern /war fare: Conventional, nuclear, Guerilla and Irregular Warfare, Limited and Specialized Warfare with reference to mountain, desert and jungle warfare, terrorism as a new mode of conflict, War as an Economic Problem, Defence and Development, Defence and Development, Defence and Development

TOTAL: 45 PERIODS

Note: NCC Credit Course Level – I is offered for NCC students only. The grades earned by the students will be recorded in the marksheet, however the same shall not be considered for the computation of CGPA

Course outcome:

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

1. Understand their roles and responsibilities
2. Demonstrate the knowledge of human values and morals
3. Actively participate in social service and development activities
4. Understand the importance of disaster management
5. Analyse the issues related to war and its effects.

Text Books

1. R. Gupta's NCC Handbook of NCC Cadets 'A', 'B' and 'C' certificate Examiantions

Reference book:

1. V. B. RAO, Personality Development and Soft Skills, BS Publications
2. Harish K. Gupta, Disaster Management, Universities press

EC3465   **DIGITAL SIGNAL PROCESSING**   L   T   P   C
                                                         3   0   2   4

OBJECTIVES:

1. To calculate the DFT using FFT
2. To design the IIR Filter.
3. To conceptualize the FIR Filter.
4. To implement the filters in standard structure.
5. To assess the finite word length effects.
6. To explore the architecture of a programmable digital signal processor.

UNIT-I: DISCRETE FOURIER TRANSFORM   9

Definition of Discrete Fourier Transform (DFT) -properties of DFT - periodicity, symmetry, circular convolution. Linear filtering using DFT. Filtering long data sequences - overlap save and overlap add method. Fast Fourier transform (FFT)- Radix-2 Decimation-in-time (DIT), Decimation-in-frequency (DIF)

UNIT-II: INFINITE IMPULSE RESPONSE FILTERS   9

Butterworth filters, Chebyshev filters. Design of IIR filters from Analog filters (LPF, HPF, BPF, BRF) - Approximation of derivatives, Impulse invariance method, Bilinear transformation. Structure of IIR filter - direct form I, direct form II, Cascade, parallel realizations.

UNIT-III: FINITE IMPULSE RESPONSE FILTERS   9

Design of FIR filters - design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method. FIR filter structures - linear phase structure, direct form realizations.

UNIT-IV: FINITE WORD LENGTH EFFECTS   9

Fixed point and floating point number representation - quantization - truncation and rounding - input / output quantization - coefficient quantization error - product

quantization error - overflow error - limit cycle oscillations due to product quantization and summation - scaling to prevent overflow.

UNIT-V: **INTRODUCTION TO DIGITAL SIGNAL PROCESSORS**   **9**

DSP functionalities - DSP architecture – Fixed and Floating point architecture (TMS320C5X and TMS320C6X) principles – Programming – Application examples

TOTAL : 45 Periods

PRACTICAL EXCERCISE

MATLAB / EQUIVALENT SOFTWARE PACKAGE/ DSP PROCESSOR BASED IMPLEMENTATION

1. Generation of Elementary Discrete Time Signals.
2. Linear and Circular Convolution.
3. Computation of DFT.
4. Computation of FFT.
5. Design of FIR filters (LPF/HPF/BPF/BSF) and demonstrate the filtering operation.
6. Design of Butterworth and Chebyshev IIR filters (LPF/HPF/BPF/BSF) and demonstrate the filtering operations.
7. Study of architecture of Digital Signal Processor.
8. Perform MAC operation using various addressing modes.
9. Generation of various signals and random noise.
10. Implement an Up-sampling and Down-sampling operation in DSP Processor.

TOTAL : 30 Periods

COURSE OUTCOMES:

On Completion of the course, the student will be able to

1. calculate the Fast Fourier Transforms by DIT and DIF techniques
2. design IIR Filters for the given specifications.
3. conceptualize FIR Filters with the given specifications
4. sketch the Filter in standard structures like Direct Form and Parallel Form
5. analyze performance degradation of digital signal processing systems due to finite precision
6. interpret the architectural details of fixed and floating digital signal processor

TEXTBOOKS:

1. J.G. Proakis and D.G. Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', Pearson Education, 2007.

2. Bhaskar, M. and Venkataramani, B, "Digital signal processors: architecture, programming and applications", Tata McGraw-Hill Pub, 2002

REFERENCE BOOKS:

1. A.V.Oppenheim, R.W. Schafer and J.R. Buck, "Discrete Time Signal Processing", , Pearson, 8th

2. Nagoorkani A, Digital Signal Processing, Tata McGraw Hill Publishing, 2012

3. Salivahanan R, Digital Signal Processing, McGraw Hill Publishing, 2019, 4th edition

4. Palani S and Kalaiyarasi K, Principles of Digital Signal Processing, Ane Books Pvt Ltd, 2015, 2nd edition.

5. NPTEL Course: https://nptel.ac.in/courses/117102060

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	3	3	-	-	-	-	2	-	-	-	3	2	3	2
CO2	3	3	3	3	-	-	-	-	2	-	-	-	3	2	3	2
CO3	3	3	3	3	-	-	-	-	2	-	-	-	3	2	3	2
CO4	3	3	3	3	-	-	-	-	2	-	-	-	3	2	3	2
CO5	3	3	3	3	-	-	-	-	2	-	-	-	3	2	3	2
CO6	3	3	3	3	-	-	-	-	2	-	-	-	3	2	3	2
CO	3	3	3	3	-	-	-	-	2	-	-	-	3	2	3	2

EC3466   **LINEAR IC AND PCB DESIGN LABORATORY**   L   T   P   C
                                                            0   0   3   1.5

OBJECTIVES:

1. To infer the basics of linear integrated circuits and available ICs

2. To analyze the characteristics of the operational amplifier.

3. To apply operational amplifiers in linear and nonlinear applications.

4. To understand the need for PCB Design, steps involved in PCB Design and Fabrication process.

5. To identify the design procedural steps for PCB design using OrcAD tool.

6. To Design an electronic printed circuit board for a specific application using industry standard software

OP-AMP BASED EXPERIMENTS: DESIGN AND TESTING OF

1   Inverting, Non-inverting Amplifier using Op-Amp.

2   Integrator and Differentiator using Op-Amp.

3   Instrumentation amplifier using Op-Amp.

4   Active low-pass and High-pass Filters using Op-Amp.

5   Bistable multivibrators and Schmitt Trigger using Op-Amp.

6   Astable and monostable multivibrators using NE555 Timer.

7   PLL characteristics

PCB DESIGN EXPERIMENTS USING OrCAD TOOL

8   Introduction to PCB Design, Fabrication & Assembly Process and Transmission lines, crosstalk, and its effects using OrCAD.

9   Using OrCAD tool, Practice the Basic RC Circuit with following PCB Design steps.

Schematic Design: Familiarization of the Schematic Editor, Schematic creation, Annotation, Netlist generation
Layout Design: Familiarization of Footprint Editor, Mapping of components, Creation of PCB layout Schematic
Create new schematic components

Create new component footprints.

10 Design and fabricate a PCB for Regulated power supply with filter and regulation sections.

TOTAL: 45 Periods

COURSE OUTCOMES:
On completion of the course, the student will be able to

1. Construct amplifiers using operational amplifiers.

2. Analyze the frequency response of the filters using operational amplifier.

3. Examine the working of PLL characteristics and multivibrators

4. Understand the steps involved in schematic, layout, fabrication, and assembly process of PCB design.

5. Design (schematic and layout) PCB for analog circuits, digital circuits, and mixed circuits.

6. Test (schematic and layout) and fabricate PCB for simple circuits.

LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS:		
S.NO	**EQUIPMENTS**	**QUANTITY**
1.	70MHz DSO with built in 4-bit pattern generator and 50 MHz AFG	15 Nos
2.	Programmable Triple o/p Power Supplies (0 –30V/ 3A) (0-30V/3A) (0-5V/3A)	15 Nos
3.	Digital Multimeter	15 Nos
4.	Digital LCR Meter	2 Nos
5.	Standalone desktops PC	15 Nos
6.	Transistor/MOSFET (BJT-NPN-PNP and NMOS/PMOS)	50 Nos
7.	IC Tester	5 Nos
8.	Copper cladded base board	15 Nos
9.	Hand Drilling machine	15 Nos
10.	Soldering guns	15 Nos
11.	Assorted electronic components for making circuits	50 Nos
12.	OrCAD/ allegro/Altium or equivalent software	15 Users
13.	Copper solvent	as required

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

COs	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	1	2	3	2	-	-	2	3	3	2	3	2	2	1
CO2	3	2	2	2	2	1	-	-	2	3	3	2	3	2	1	1
CO3	3	2	2	2	2	1	-	-	2	3	3	2	3	2	1	1
CO4	3	2	1	2	2	1	-	-	2	3	3	2	3	2	1	1
CO5	3	2	2	2	2	1	-	-	2	3	3	2	3	2	1	1
CO6	3	2	2	2	2	1	-	-	2	3	3	2	3	2	1	1
Avg	3	2	2	2	2	1	-	-	2	3	3	2	3	2	1	1

EC3467   **MICROPROCESSORS, MICROCONTROLLERS AND**   **L T   P   C**
INTERFACING LABORATORY   **0 0   4   2**

OBJECTIVES:

1. To develop assembly Language program for 8086 Microprocessor.
2. To introduce string manipulation instructions for 8086 Microprocessor.
3. To understand the working of peripheral devices.
4. To enumerate programs to interface memory, I/O's with processor.
5. To develop assembly Language program for 8051 Microcontroller.
6. To explore the Interfacing of stepper motor and temperature sensor with microcontroller.

LIST OF EXPERIMENTS: 8086 Programs using kits and MASM

1. Basic arithmetic and logical operations.
2. Move a data block without overlap.
3. Code conversion, decimal arithmetic and matrix operations.
4. String manipulations, sorting and searching.

LIST OF EXPERIMENTS: Peripherals and Interfacing Experiments using 8086.

5. Interfacing traffic light controller.
6. Interfacing ADC and DAC.
7. Implementing waveform generation.
8. Interfacing key board and LCD.
9. Analyze serial interface and parallel interface.

LIST OF EXPERIMENTS: 8051 Microcontroller based Experiments using kit and MASM.

10. Program basic arithmetic and logical operations.
11. Interfacing stepper motor and temperature sensor.

LIST OF EXPERIMENTS: PIC18 Microcontroller based Experiments using Proteus software.

12. Blinking of LED with delay routine
13. Interfacing key board and LCD.
14. Interfacing Temperature sensor

TOTAL PERIODS: 60

OUTCOMES:

On completion of this laboratory course, the student will be able to,

1. Write ALP Programs for Arithmetic operations and Logical operations.

2. Express the programming logics for code conversion

3. Analyze the working principle of ADC and DAC.

4. Interface different I/O's with processor and Generate waveforms using 8086

5. Execute microcontroller programs in 8051.

6. Design a mini Project using PIC Microcontroller.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS 3 STUDENTS PER EXPERIMENT:

S.NO	NAME OF THE EQUIPMENT	REQUIRED
1.	Intel Desktop Systems with MASM	10 No's
3.	8086 Microprocessor Trainer with Power Supply	10 No's
4.	8051 Micro Controller Trainer Kit with power supply	5 No's
5.	8255 Interface boards	3 No's
6.	8251 Interface boards	3 No's
7.	8259 Interface boards	3 No's
8.	8279 Keyboard / Display Interface boards	3 No's
9.	8254 timer/ counters, 8253 Timer	3 No's
10.	ADC and DAC cards	3 No's
11.	AC & DC motor with Controllers	2 No's
12.	Traffic Light Control Systems	3 No's
13.	Stepper Motor	3 No's
14.	CRO (Cathode Ray Oscilloscope - 20 MHz)	2 No's

COURSE OUTCOMES - PROGRAM OUTCOMES MATRIX

CO	PO												PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**
1	3	-	2	-	3	-	-	-	2	2	-	3	2	2	3	-
2	2	-	3	-	3	-	-	-	2	2	-	2	2	-	3	-
3	2	-	3	-	3	-	-	-	2	2	-	2	2	-	3	-
4	1	2	3	-	3	-	-	-	1	2	-	2	2	-	3	-
5	1	2	3	-	3	-	-	-	2	2	-	2	2	-	3	3
6	1	2	3	2	3	2	2	2	2	2	-	2	2	2	3	3
AVG	2	2	3	2	3	2	2	2	2	2	-	2	2	2	3	3