VELAMMAL

COLLEGE OF ENGINEERING & TECHNOLOGY, MADURAI – 625 009
(Autonomous)

(Accredited by NAAC with 'A' Grade and by NBA for 6 UG Programmes)
(Approved by AICTE and affiliated to Anna University, Chennai)

DEPARTMENT OF ELECTRONICS ENGINEERING

(VLSI DESIGN AND TECHNOLOGY)

B.E. ELECTRONICS ENGINEERING
(VLSI DESIGN AND TECHNOLOGY)

REGULATIONS - 2025

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM (I - IV SEMESTERS)
SYLLABI (I - IV SEMESTERS)

(For the students admitted in the academic year 2025-2026)

VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
VIRAGANOOR, MADURAI–625 009.
B.E. ELECTRONICS ENGINEERING (VLSI DESIGN AND TECHNOLOGY)

CHOICE BASED CREDIT SYSTEM

REGULATIONS 2025
BATCH 2025 - 2029
CURRICULUM FOR SEMESTERS I TO IV

SEMESTER I

Sl. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			CREDITS
				L	T	P	
1.	IP25C01	Induction Programme *(Common to all B.E./B.Tech. Programmes)*	MC	-	-	-	-
THEORY COURSES							
2.	EN25C01	Technical English *(Common to all B.E./B.Tech. Programmes)*	HSMC	3	0	0	3
3.	MA25103	Matrices and Calculus	BSC	3	1	0	4
4.	PH25C01	Engineering Physics *[Common to B.E. Civil, CSE, ECE, EEE, CSE(CS), EE(VLSI) and B.Tech. IT, AI&DS Programmes]*	BSC	3	0	0	3
5.	CH25C01	Engineering Chemistry *(Common to all B.E./B.Tech. Programmes)*	BSC	3	0		3
6.	CS25C01	Problem Solving using C Programming *(Common to B.E. Civil, CSE, ECE, EEE, CSE(CS), EE(VLSI) and B.Tech. IT, AI&DS Programmes)*	ESC	3	0	0	3
7.	ME25C01	Engineering Graphics and Design *[Common to B.E. CSE, EEE, CSE(CS), EE(VLSI), Mech., and B.Tech. IT, AI&DS Programmes]*	ESC	2	0	2	3
8.	TA25C01	Heritage of Tamils / தமிழர் மரபு *(Common to all B.E./B.Tech. Programmes)*	HSMC	1	0	0	1
PRACTICAL COURSES							
9.	CS25C02	Programming in C Laboratory *(Common to B.E. Civil, CSE, ECE, EEE, CSE(CS), EE(VLSI) and B.Tech. IT, AI&DS Programmes)*	ESC	0	0	4	2
10.	EM25C01	Engineering Practices Laboratory *[Common to B.E. Civil, CSE, CSE(CS), EEE, EE(VLSI), Mech. and B.Tech. IT Programmes]*	ESC	0	0	4	2
TOTAL CREDITS				**18**	**1**	**10**	**24**

SEMESTER II

Sl. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			CREDITS
				L	T	P	
THEORY COURSES							
1.	EN25C02	English Proficiency and Soft Skills *[Common to B.E. Civil, CSE, EEE, CSE(CS), EE(VLSI) and B.Tech. IT, AI&DS Programmes]*	HSMC	2	0	2	3
2.	MA25205	Numerical Methods and Statistical Analysis	BSC	3	1	0	4
3.	PH25204	Applied Physics for VLSI Engineering	BSC	3	0	0	3
4.	CH25C02	Environmental Science *(Common to all B.E./B.Tech. Programmes)*	BSC	2	0	0	2
5.	VD25101	Semiconductor Devices	PCC	3	0	0	3
6.	VD25102	Circuits and Network Theory	PCC	3	1	0	4
7.	TA25C02	Tamils and Technology / தமிழரும் ததொழில்நுட்பமும் *(Common to all B.E./B.Tech. Programmes)*	HSMC	1	0	0	1
PRACTICAL COURSES							
8.	PC25C01	Physics and Chemistry Laboratory *(Common to all B.E./B.Tech Programmes)*	BSC	0	0	4	2
9.	VD25103	Devices and Circuit Analysis Laboratory	PCC	0	0	4	2
TOTAL CREDITS				**17**	**3**	**10**	**24**

SEMESTER III

Sl.No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			CREDITS
				L	T	P	
THEORY COURSES							
1.	MA25303	Transforms and Partial Differential Equations	BSC	3	1	0	4
2.	VD25201	Digital System Design	PCC	3	0	0	3
3.	VD25202	Analog Circuits	PCC	3	0	0	3
4.	VD25203	Integrated Circuit Design	PCC	3	0	0	3
5.	VD25204	Principles of Signals and Systems	PCC	3	0	0	3
PRACTICAL COURSES							
6.	VD25205	Analog Circuits and Simulation Laboratory	PCC	0	0	3	1.5
7.	VD25206	Digital System Design Laboratory	PCC	0	0	3	1.5
8.	CS25C14	Problem Solving using Python Programming Laboratory	ESC	0	0	4	2
TOTAL CREDITS							**21**

SEMESTER IV

Sl.No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			CREDITS
				L	T	P	
THEORY COURSES							
1.	MA25405	Graph Theory and its Applications	BSC	3	1	0	4
2.	VD25207	Discrete Time Signal Processing	PCC	3	0	0	3
3.	VD25208	Microprocessor, Microcontroller and Interfacing	PCC	3	0	0	3
4.	VD25209	Computer Architecture and Organization	PCC	3	0	0	3
5.	VD25210	Control Systems Engineering	PCC	3	0	0	3
6.	VD25211	Electromagnetic Waves and Electromagnetic Compatibility	PCC	3	0	0	3
PRACTICAL COURSES							
7.	EN25C06	Professional Skills Enhancement Laboratory	HSMC	0	0	2	1
8.	VD25212	Microprocessor, Microcontrollers and Interfacing Laboratory	PCC	0	0	3	1.5
TOTAL CREDITS							**21.5**

SEMESTER I

IP25C01	INDUCTION PROGRAMME *(Common to all B.E./B.Tech. Programmes)*	L	T	P	C
		-	-	-	-

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfil his/her responsibility as an engineer, as a citizen and as a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont‟s, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and **therefore there shall be no tests / assessments** during this programme.

REFERENCE:

Guide to Induction program from AICTE

EN25C01	TECHNICAL ENGLISH (Common to all B.E./B.TECH. Programmes)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

The course enables the students to:

- Recognize and interpret listening cues for enhancing comprehending skills in spoken interactions
- Develop confidence in expressing ideas clearly in speaking situations.
- Understand and apply vocabulary effectively while summarizing written content.
- Build the ability to plan and structure coherent written compositions
- Encourage articulation to support personal viewpoints in diverse formats.

UNIT I	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	9

Listening – Pronunciation, Stress, Syllable, Listening for general information and specific details - Listening and filling a form; **Speaking -** Self Introduction, asking for information to fill details in a form; **Reading -** Comprehension Passages - Skimming Scanning and intensive & extensive reading; **Writing -** Writing emails / letters (formal & informal - requisition, Complaint); **Grammar** - Parts of Speech (Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections), Kinds of Sentences; **Vocabulary -** Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II	NARRATION AND SUMMATION	9

Listening - Listening short talks/ podcast/ stories / event narration, documentaries and say true or false **Speaking** - Narrating personal experiences/events, summarizing of documentaries/podcasts; **Reading** - Reading biographies, travelogues & technical blogs; **Writing** -- Paragraph writing, Short Report on an event (Industrial visits etc.); **Grammar** - Question types: Framing "WH" Questions & Yes or No Questions and Tenses; **Vocabulary** - Word forms (prefixes & suffixes), Antonyms, Phrasal verbs.

UNIT III	DESCRIPTION OF A PROCESS / PRODUCT	9

Listening - Listening to advertisements about products and process descriptions and summarize them: **Speaking** - Giving instruction to use the product; Presenting a product; **Reading** - Reading advertisements, gadget reviews; user manuals; **Writing** - Writing definitions; instructions; and Product /Process description; **Grammar** - Tenses, Subject - Verb Agreement; **Vocabulary** - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words)

UNIT IV	CLASSIFICATION AND RECOMMENDATIONS	9

Listening - Listening to TED Talks; differentiate instructions and recommendations; **Speaking** – Short Talk; Mini presentations and making recommendations; **Reading** - Newspaper articles - interviews, Non Verbal Communication (infographics, tables, pie charts etc) to understand and classify information **Writing** - Writing recommendations; Transferring information from non - verbal (chart, graph etc, to verbal mode) **Grammar** - Articles, Degrees of comparison; **Vocabulary** - Collocations; Fixed / Semi fixed expressions.

UNIT V	EXPRESSIONS	9

Listening - Listening to debates/ discussions; different viewpoints on an issue; and panel discussions; **Speaking -** Group discussions, Debates, and Expressing opinions through Simulations & Role-play; **Reading** - Reading editorials; and Opinion Blogs; **Writing** - Essay Writing (Descriptive or narrative); **Grammar** -Phrases & Clauses, Simple, Compound & Complex Sentences; **Vocabulary** - Connotations- Content vs. Function words.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Identify listening cues and respond appropriately in real-time communication.

C02: Deliver spoken messages clearly and appropriately in varied contexts.

CO3: Use new vocabulary in context and summarize main ideas from texts.

CO4: Create and organize clear written compositions.

CO5: Express and justify opinions through oral, written, and digital formats

TEXT BOOK:

1. Shoba. K N.& Lourdes Joavani Rayen. "Communication Skills", New Delhi, Cambridge University Press, 2021
2. Board of Editors, Fluency in English-A Course book for Undergraduate Engineers and Technologists. Orient Blackswan Pvt Ltd, Hyderabad: 2018
3. Jawahar, Jewelcy & Rathna.P. Communicative English Workbook. VRB Publishers Pvt Ltd. Chennai. 2018.

REFERENCE BOOKS:

1. Department of English. Mindscapes English for Technologists and Engineers. Orient Black swan Ltd, Hyderabad: 2012
2. Verma, Shalini. Technical Communication for Engineers. Vikas Publishing House Pvt Ltd. New Delhi. 2015
3. Rizvi, Ashraf.M. Effective Technical Communication. MCGraw Hill Education Pvt Ltd. New Delhi. 2016.
4. Leech Geoffrey and Svartvik Jan. A Communicative Grammar of English. Third Edition, Routledge, New York. 2013

WEB SOURCES:

1. www.esl.org
2. elt.oup.com/learning resources
3. a4esl.org

CO		PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
		K-Level	K3	K4	K5	K5	K6	K3	K2	K3	K3	K2	K3
CO1	Identify listening cues and respond appropriately in real-time communication.	K3	_	_	_	_	_	_	2	1	3	-	2
CO2	Deliver spoken messages clearly and appropriately in varied contexts.	K3	_	_	_	_	_	_	2	2	3	-	2
CO3	Use new vocabulary in context and summarize main ideas from texts.	K2	_	_	_	_	_	_	_	_	3	-	2
CO4	Create clear written compositions.	K6	_	_	_	_	1	_	2	1	3	-	2
CO5	Express the opinions through oral, written, and digital formats.	K5	_	_	_	_	1	1	2	2	3	-	2
Course Contribution													

MA25103	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES :

- To establish the matrix concepts in engineering applications.
- To experiment with the concepts of differentiation and its application in Engineering problems.
- To make use of the concept of functions of several variables and partial derivatives in various fields of Engineering.
- To demonstrate the various techniques of integration.
- To develop the idea of evaluating double and triple integrals.

UNIT I	MATRICES	12

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformations – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications of matrices : Principal Component Analysis, Stretching of elastic membrane.

UNIT II	DIFFERENTIAL CALCULUS	12

Differentiation – Implicit differentiation – Logarithmic differentiation – Applications: Maxima and minima of functions of one variable, Radius of curvature - Centre of curvature – Circle of curvature.

UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12

Partial differentiation – Homogeneous functions and Euler‟s theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor‟s series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange‟s method of undetermined multipliers.

UNIT IV	INTEGRAL CALCULUS	12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, integration of irrational functions – Improper integrals – Applications of integral calculus.

UNIT V	MULTIPLE INTEGRALS	12

Double integrals – Change of order of integration – Double integration in polar coordinates - Area enclosed by plane curves – Triple integrals – Volume of solids(Cartesian Coordinates only) – Change of variables in double and triple integrals – Applications : Moments and centre of mass, moment of inertia.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Apply the matrix algebra for Eigen value related application problems
CO2: Apply differential calculus techniques in solving various Engineering problems
CO3: Determine the solution for functions involving two variables
CO4: Identify suitable methods of integration in practical problems.
CO5: Solve the practical problems of finding areas, volume using multiple integrals.

TEXT BOOKS:

1. Grewal.B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2018.
2. Bali N.P and Manish Goyal, "A Text Book of Engineering Mathematics", 8th Edition, Lakshmi Publications Pvt., Ltd., New Delhi, 2011.
3. Kreyszig.E, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons, New Delhi, 2016.

REFERENCES:

1. James Stewart, "Calculus: Early Transcendentals", 8th Edition, Cengage Learning, New Delhi, 2015
2. Ramana. B.V., "Higher Engineering Mathematics", 6th Edition, McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
3. Jain. R.K.and Iyengar. S.R.K., "Advanced Engineering Mathematics", 5th Edition, Narosa Publications, New Delhi, 2016.

CO-PO-PSO Mapping

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

PH25C01	ENGINEERING PHYSICS *(Common to B.E. Civil, CSE, ECE, EEE, CSE(CS), EE(VLSI) and B.Tech. IT, AI&DS Programmes)*	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To illustrate the effective understanding of mechanics.
- To gain knowledge on oscillations and thermal physics.
- To explain the working of laser and its applications.
- To outline the importance of quantum mechanics.
- To understand crystal structures and its applications.

UNIT I	MECHANICS OF MATERIALS	9

Rigid body – Centre of mass: 1D & 3D – Elasticity –Hooke‟s law - Poisson‟s ratio - stress-strain diagram for ductile and brittle materials(basic) – Uses - Bending of beams – Cantilever - Simply supported beams - uniform and non-uniform bending - Young‟s modulus determination - I shaped girders.

UNIT II	OSCILLATIONS AND THERMAL PHYSICS	9

Simple harmonic motion - Torsional pendulum –Introduction to Damped and Forced oscillations – Shock absorber – Resonance - Introduction to conduction, convection and radiation - Thermal expansion – Expansion joints – Bimetallic strip – Seebeck effect – thermocouple.

UNIT III	LASERS	9

Laser – characteristics – spontaneous and stimulated emission - population – inversion - Metastable states - CO2 laser, Semiconductor laser - Industrial and medical applications - Optical Fibers – Total internal reflection – Numerical aperture and acceptance angle – Fiber optic communication.

UNIT IV	QUANTUM MECHANICS	9

Black body radiation (Qualitative) – Planck‟s hypothesis - Matter waves – de Broglie hypothesis - Electron microscope – Uncertainty Principle – The Schrodinger Wave equation (time-independent and time-dependent) – Physical significance of wave function - Degenerate energy states - Barrier penetration and quantum tunneling - Tunneling microscope.

UNIT V	CRYSTAL PHYSICS	9

Crystal Bonding – Ionic – covalent – metallic and van der Wall‟s molecular bonding - Introduction to Crystal systems (unit cell, Bravais lattices, Miller indices) - Crystal structures - atomic packing density of BCC, FCC and HCP structures - crystal imperfections - point defects - edge and screw dislocations – grain boundaries. X-ray diffractometer.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the basic properties of materials

CO2: Express the knowledge based on applications of oscillations and thermal Physics.

CO3: Know the basics of optics, lasers and its applications

CO4: Demonstrate the importance of quantum physics.

CO5: Apply the significance of crystal physics.

TEXT BOOKS:

1. Raymond A. Serway, John W. Jewett, "Physics for Scientists and Engineers", Thomson Brooks/Cole, 1st Edition 2013.
2. D. Halliday, R. Resnick and J. Walker, "Principles of Physics. John Wiley & Sons", 10th Edition, 2015.
3. N. Garcia, A. Damask and S. Schwarz, "Physics for Computer Science Students", Springer- Verlag, 1st Edition, 2012.
4. Alan Giambattista, Betty McCarthy Richardson and Robert C. Richardson, "College Physics", McGraw-Hill Higher Education, 1st Edition, 2012.

REFERENCES:

1. R. Wolfson, "Essential University Physics", Volume 1 & 2. Pearson, 1st Edition, 2016.
2. D. Kleppner and R. Kolenkow, "An Introduction to Mechanics", McGraw Hill Education, 1st Edition, 2017.
3. K. Thyagarajan and A. Ghatak, "Lasers: Fundamentals and Applications", Springer, 1st Edition, 2012

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
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	-
Course Contribution	2	1	-	-	-	-	-	-	1	-	-	1	-

CH25C01	ENGINEERING CHEMISTRY *(Common to all B.E./B.Tech. Programmes)*	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To inculcate the sound understanding of water quality parameters and water treatment techniques.
- To acquire basic principles and preparatory methods of nanomaterials.
- To describe the characteristics, applications of polymeric materials and composites.
- To illustrate the operating principles in electrochemistry and working processes and applications of storage devices.
- To use appropriate synthetic fuels and fuel additives for better combustion characteristics.

UNIT I	WATER AND ITS TREATMENT	9

Water: Sources and impurities, **Water quality parameters:** Definition and significance of- colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. **Municipal water treatment:** primary treatment and disinfection (UV, Ozonation, break-point chlorination)**.** **Boiler troubles:** Scale and sludge, boiler corrosion, caustic embrittlement, priming & foaming. **Treatment of boiler feed water**: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and external treatment – Ion exchange demineralization and zeolite process. **Desalination of brackish water**: Reverse Osmosis (RO) method.

UNIT II	NANOCHEMISTRY	9

Basics: Distinction between molecules, nanomaterials and bulk materials; **Size-dependent properties** (optical, electrical, mechanical and magnetic). **Preparation of nanomaterials:** sol- gel, solvothermal, laser ablation, chemical vapour deposition, and electrochemical deposition. **Applications** of nanomaterials. **Sensors**: Basic components, types and applications. Chemiresistive sensors - environmental monitoring – CO_2 sensor.

UNIT III	POLYMERS AND COMPOSITES	9

Polymers: Classification, functionality of monomers, Types of polymerizations, free radical mechanism, degree of polymerization, weight and number average molecular weights (definition only). **Engineering Plastics** - Properties and types. **Composites:** Definition & need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and reinforcement (fiber, particulates, flakes and whiskers). **Properties and applications**: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites.

UNIT IV	ELECTROCHEMICAL POWER SOURCES	9

Electrochemical cells – EMF, electrode potential, dependence of emf on electrolyte concentration – Nernst equation. Electrochemical series and its applications. **Batteries:** Types of batteries, primary battery - dry cell, secondary battery - lead acid battery, Zn-Carbon, and lithium-ion-battery; **Fuel cells:** H2-O2 fuel cell, **Supercapacitors:** Storage principle, types and examples. **Electric vehicles -** working principles.

UNIT V	FUELS AND COMBUSTION	9

Fuels: Introduction, classification of fuels; **Coal and coke**: Analysis of coal (proximate and ultimate), Carbonization, and manufacture of metallurgical coke (Otto Hoffmann method). **Petroleum and Diesel:** Manufacture of synthetic petrol (Bergius process), knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel. **Combustion of fuels:** Introduction, calorific value - higher and lower calorific values, Theoretical calculation of calorific value; **Ignition temperature**: spontaneous ignition temperature, Explosive range; **Flue gas analysis** - ORSAT Method. CO_2 emission and carbon foot print.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.

CO2: Describe the basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.

CO3: Apply the knowledge of polymers and composites for material selection requirements.

CO4: Illustrate the basics of electrochemistry and apply them for suitable applications in energy sectors.

CO5: Utilize different fuels and predict their performance and combustion characteristics.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", 12th Edition, S. Chand Publishing, 2018.

REFERENCES:

1. B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-II M Series in Metallurgy and Materials Science, 2018.
2. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", 2nd Edition, Cambridge University Press, Delhi, 2019.
3. V. R. Gowarikar, N.V. Viswanathan and Jayadev Sreedhar, "Polymer Science", New Age International (P) Ltd., 2015.

CO-PO-PSO Mapping

Course Outcomes(CO) At the end of the course, the learners will be able to	K-Level	Program Outcomes (PO)											Program Specific Outcomes (PSO)	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1: Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water	K2	2	1	-	-	-	1	1	-	1	-	-	-	-
CO2: Describe the basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications	K2	2	1	-	-	1	-	-	-	1	-	-	1	-
CO3: Apply the knowledge of polymers and composites for material selection requirements	K3	2	1	-	-	1	-	1	-	1	-	-	-	-
CO4: Illustrate the basics of electrochemistry and apply them for suitable applications in energy sectors	K2	2	1	-	-	-	1	1	-	1	-	-	-	-
CO5: Utilize different fuels and predict their performance and combustion characteristics	K2	2	1	-	-	-	1	1	-	1	-	-	-	-
Course Contribution		**2**	**1**	**-**	**-**	**1**	**1**	**1**	**-**	**1**	**-**	**-**	**1**	**-**

CS25C01	PROBLEM SOLVING USING C PROGRAMMING (Common to B.E. Civil, CSE, ECE, EEE, CSE(CS), EE(VLSI) and B.Tech. IT, AI&DS Programmes)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To understand the constructs of C Programming.
- To apply conditional and looping constructs in C Programming to manage program execution flow.
- To develop applications that effectively use arrays and strings for data storage and manipulation
- To develop modular applications using functions and pointers.
- To design and implement applications using structures and unions for efficient handling of complex data types.

UNIT I	INTRODUCTION	7

Evolution of Programming Languages - Programming Paradigms : Structured programming - Object Oriented programming - Functional programming -Algorithms - Pseudo code and Flowchart - Structure of C Program - Compilation Process -Preprocessor Directives - C Tokens.

UNIT II	CONTROL FLOW STATEMENTS	9

Expressions –I/O Statements - Operators: Precedence and Associativity -Decision Making Statements: if -else if ladder, Nested if, Switch statements - Iterative Statements: For, While, Do while statements-Break, Continue Statements.

UNIT III	ARRAYS AND STRINGS	9

Arrays: Declaration, Initialization – One Dimensional Array – Multi Dimensional Arrays - String: String Operations - Sorting: Selection Sort - Searching: Linear and Binary Search.

UNIT IV	FUNCTIONS AND POINTERS	11

Modular Programming: Function Prototype, Function Definition, Function Call, Built-in Functions: String Functions and Math Functions - User Defined Functions – Recursion - Pointers: Pointer Operators, Pointer Arithmetic, Arrays and Pointers, Array of Pointers - Parameter Passing: Pass by Value and Pass by Reference.

UNIT V	STRUCTURES AND UNION	9

Structure: Defining and Processing a Structure - Nested Structures - Passing Structure to Functions - Array of Structure – Self-referential Structure- Pointer to Structure - Union - Dynamic Memory Allocation - File Processing.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Demonstrate the constructs of C Programming (K2-Understand)
CO2: Build applications using Conditional and Looping constructs in C (K3-Apply)
CO3: Design applications using Arrays and Strings in C (K3-Apply)
CO4: Make use of Functions and Pointers and develop applications (K3-Apply)
CO5: Make use of Structure and Union to design applications (K3-Apply)

TEXT BOOKS:

1. ReemaThareja, "Programming in C",3rd edition, Oxford University Press,2023.
2. Deitel.H.M, Deitel.P.J , "C: How to Program", Pearson, 9th Edition, New Delhi, 2022.
3. PradipDey, ManasGhosh, "Programming in C", Oxford University, New Delhi, 2018.

REFERENCES:

1. Gottfried B, "Programming with C", McGraw Hill, 4th Edition, Noida, 2018.
2. Herbert Schildt, "C: The Complete Reference", McGraw Hill, 4th Edition, Noida, 2017.
3. Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

Suggested activities for assignment/Self Study

1. Design and develop flowchart for real time applications like ticket reservation system, Electricity Billing, Retail shop billing etc using online tools such as Smart draw, Luci, Canva etc.,	K3	CO1
2. Programming/ Code Debugging using online programming platforms like Hackerrank, Leetcode, Code Chef.	K3	CO2, CO3, CO4, CO5

CO-PO-PSO Mapping

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

ME25C01	ENGINEERING GRAPHICS AND DESIGN *(Common to B.E. CSE, EEE, CSE(CS), EE(VLSI), Mech, and B.Tech. IT, AI&DS Programmes)*	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES :

- Apply fundamental concepts of engineering graphics and orthographic projections using basic 2D CAD software.
- Interpret and sketch the projection of simple solids and understand basic 3D CAD modeling techniques.
- Create sectional views and develop true shapes of solids through manual sketching and CAD tools.
- Apply isometric projection techniques and use basic AR/VR tools to visualize engineering objects.
- Sketch orthographic projections and understand the fundamentals of design for 3D printing and additive manufacturing.

UNIT I	BASICS OF ENGINEERING GRAPHICS AND VISUALIZATION	9

Introduction to Engineering Graphics: Importance, applications, and tools. Use of Drafting Instruments: Lettering, dimensioning, line types, and scales. Orthographic Projections: Principles, projection of points, straight lines. *Introduction to CAD Software: Basics of 2D drawing and layout views. Demo on 2D CAD practice – Demo. Introduction to UX/UI in Engineering Design: Overview of the importance of user interface (UI) and user experience (UX) in engineering applications (e.g., dashboards, software interfaces) – Demo.*

UNIT II	PROJECTION OF SOLIDS	9

Projection of Solids: Prisms, pyramids, cylinders, cones, with the axis inclined to principal planes. *Basic CAD Modelling of Solids: Introduction to simple 3D modelling in CAD tools. Demo on 3D CAD practice – Demo.*

UNIT III	PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES	9

Sectioning of Solids: Sectional views of simple solids with cutting planes inclined to horizontal plane. True Shape of Sectional Views: Obtaining true shape and development of sections.

UNIT IV	ISOMETRIC PROJECTIONS	9

Isometric Projection: Principles, isometric scale, and isometric views of simple solids like prisms, pyramids, cones and cylinders. *Introduction to Visualization Tools: Use of simple AR/VR applications for viewing isometric and perspective projections. Demo on AR/VR – Demo.*

UNIT V	ORTHOGRAPHIC PROJECTIONS AND DESIGN APPLICATIONS	9

Freehand Sketching: Sketching orthographic views of simple isometric solids. *Design for 3D Printing: Basics of modeling for additive manufacturing. Demo on 3D Printing – Demo.*

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Construct orthographic projections of points, lines, and simple objects using drafting tools and 2D CAD software.

CO2: Sketch projections of prisms, pyramids, cylinders, and cones and create basic 3D models using CAD software.

CO3: Generate sectional views and develop true shapes of simple solids using manual and CAD tools.

CO4: Create isometric projections and use AR/VR tools for enhanced spatial visualization of engineering objects.

CO5: Apply freehand sketching to produce orthographic projections and understand basic 3D printing design considerations.

TEXT BOOKS:

1. Natarajan K.V., "A text book of Engineering Graphics", 31st Edition, Dhanalakshmi Publishers, Chennai, 2018.
2. Venugopal K. and Prabhu Raja V.,"Engineering Graphics", 15th Edition, New Age International (P) Limited, 2018.
3. Bhatt N.D. and Panchal V.M., "Engineering Drawing", 53rd Edition, Charotar Publishing House, 2014.

REFERENCES:

1. S.S. Sashikiran., "The 7S Design Framework", 1st Edition, Notion Press, 2024.
2. Rajiv Chopra, "Virtual and Augmented Reality" 1st Edition, Khanna Publishing House, 2021.
3. Sabrie Soloman, "3D Printing & Design", 1st Edition, Khanna Publishing House, 2020.

CO-PO-PSO Mapping

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

TA25C01	HERITAGE OF TAMILS *(Common to all B.E./B.Tech. Programmes)*	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, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.					
UNIT III	**FOLK AND MARTIAL ARTS**				**3**
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, 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 - 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**
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.					
TOTAL: 15 PERIODS					

TEXT-CUM-REFERENCE BOOKS

1. கே.கே. பிள்ளள, "தமிழேவரலாறு – மேேளும் பண்பாடும்", தமிழ்நாடு பாடநூல் மற்றும் ேல்வியியல் பணிேள் ேழேம்.
2. முளைவர் இல. சுந்தரம், "ேணிைித்தமிழ்", விேைட் பிரசுரம்.
3. "கீழடி – ளவளே நதிேேளரயில் சங்ேேோல நேர நாேரிேம்", ததால்லியல் Fளறதவளியீடு.
4. "தபாருளந – ஆற்றங்ேளர நாேரிேம்", ததால்லியல் Fளற தவளியீடு.
5. Dr.K.K.Pillay, "Social Life of Tamils", A joint publication of TNTB & ESC and RMRL – (in print).
6. Dr.S.Singaravelu, "Social Life of the Tamils - The Classical Period", International Institute of Tamil Studies.
7. Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu, " Historical Heritage of the Tamils", International Institute of Tamil Studies.
8. Dr.M.Valarmathi, "The Contributions of the Tamils to Indian Culture", International Institute of Tamil Studies.
9. Keeladi, "Sangam City Civilization on the banks of river Vaigai", Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
10. Dr.K.K.Pillay, "Studies in the History of India with Special Reference to Tamil Nadu".
11. Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
12. R.Balakrishnan, "Journey of Civilization Indus to Vaigai", RMRL.

TA25C01	தமிழர் மரபு *(Common to all B.E./B.Tech. Programmes)*	L	T	P	C
		1	0	0	1
அலகு 1	**மமொழி மற்றும் இலக்கியம்**				**3**
இந்திய தமாழிேல்,திராவிட தமாழிேள், தமிழ் ஒரு தசம்தமாழி, தமிழ் தசவ்விலேகியங்ேள், சங்ே இலேகியத்திைல் சமயச் சார்பற்ற தைளம, சங்ே இலேகியத்தில் பகிர்தல் அறம், திருேகுறளில் கமலாண்ளமே ேருத்Fேகேள், தமிழ்ேக ேமாப்பியங்ேள், தமிழ்ேத்தில் சமண தபௌத்த சமயங்ேளிைல் தாேகேம், பேதி இலேகியம், ஆழ்வார்ேள் மற்றும் நாயன்மார்ேள்,சிற்றிலேகியங்ேள், தமிழில் நவீே இலேகியத்திைல் வளர்ச்சி தமிழ் இலேகிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசின் பங்ேளிப்பு.					
அலகு 2	**மரபு - பொறற ஓவியங்கள் முதல் நவீன ஓவியங்கள் வறர- சிற்பக்கறல**				**3**
நடுேல் முதல் நவீே சிற்பங்ேள் வளர,ஐம்தபாைல் சிளலேள்,பழங்குடியிைர் மற்றும் அவர்ேள் தயாரிேகும் ளேவிளைப் தபாருட்ேள், தபாம்ளமேள், கதர் தசய்யும் ேளல,சுடுமண் சிற்பங்ேள்,நாட்டுப்புறத் ததய்வங்ேள், குமரிமுளையில் திருவள்ளுவர் சிளல,இளசே ேருவிேள் – மிருதங்ேம், பளற, வீளண, யாழ், நாதஸ்வரம்,தமிழர்ேளிைல் சமூே தபாருளாதார வாழ்வில் கோவில்ேளிைல் பங்கு.					
அலகு 3	**நொட்டுப்புற கறலகள் மற்றும் வீர விறளயொட்டுக்கள்**				**3**
ததருேகூத்F,ேரோட்டம் ,வில்லுப்பாட்டு,ேணியாைல் கூத்F, ஒயிலாட்டம், கதால்பாளவே கூத்F, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்ேளிைல் விளளயாட்டுேகேள்.					
அலகு 4	**தமிழர்களின் திறைக் ககொட்பொடுகள்**				**3**
தமிழ்ேத்திைல் தாவரங்ேளும், விலங்குேளும், ததால்ேமாப்பியம் மற்றும் சங்ே இலேகியத்தில் அேம் மற்றும் புற்ேகோட்பாடுேள், தமிழர்ேள் கபாற்றிய அற்ேகோட்பாடு, சங்ேேமாலத்தில் தமிழ்ேத்தில் எழுத்தறிவும், ேல்வியும் சங்ேேமால நேரங்ேளும் Fளற முேங்ேளும், சங்ேேமாலத்தில் ஏற்றுமதி மற்றும் இற்ேகுமதி ேடல்ேடந்த நாடுேளில் கசாழர்ேளிைல் தவற்றி.					
அலகு 5	**இந்திய கதசிய இயக்கம் மற்றும் இந்திய பைபொட்டிற்குத் தமிழர்களின் பங்களிப்பு**				**3**

இந்திய விடுதளலப்கபாரில் தமிழர்ேளிைஃ பங்கு,இந்தியாவிைஃ பிற பகுதிேளில் தமிழ்ப் பண்பாட்டிைஃ தாேஃ்ேம், சுயமரியாளத இயேம், இந்திய மருத்Fவத்தில், சித்த மருத்Fவத்திைஃ பங்கு, ேல்தவட்டுேள், ளேழுத்Fப்படிேள்,தமிழ்ப் புத்தேங்ேளிைஃ அச்சு வரலாறு.

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. கே.கே. பிள்ளள, "தமிழே வரலாறு – மேேளும் பண்பாடும்", தமிழ்நாடு பாடநூல் மற்றும் ேல்வியியல் பணிேள் ேழேம்.
2. முளைவர் இல. சுந்தரம், "ேணிைஃித்தமிழ்", விேைட் பிரசுரம்.
3. "கீழடி – ளவளே நதிேஃ்ேளரயில் சங்ேேஃால நேர நாேரிேம்", ததால்லியல் Fளற தவளியீடு.
4. "தபாருளந – ஆற்றங்ேளர நாேரிேம்", ததால்லியல் Fளற தவளியீடு.
5. Dr.K.K.Pillay , "Social Life of Tamils", A joint publication of TNTB & ESC and RMRL – (in print).
6. Dr.S.Singaravelu, "Social Life of the Tamils - The Classical Period", International Institute of Tamil Studies.
7. Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu, "Historical Heritage of the Tamils", International Institute of Tamil Studies.
8. Dr.M.Valarmathi, "The Contributions of the Tamils to Indian Culture", International Institute of Tamil Studies.
9. Keeladi, "Sangam City Civilization on the banks of river Vaigai', Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
10. Dr.K.K.Pillay, "Studies in the History of India with Special Reference to Tamil Nadu".
11. Porunai Civilization, Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu.
12. R.Balakrishnan, "Journey of Civilization Indus to Vaigai", RMRL.

CS25C02	PROGRAMMING IN C LABORATORY *(Common to B.E. Civil, CSE, ECE, EEE, CSE(CS), EE(VLSI) and B.Tech. IT, AI&DS Programmes)*	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES :

- To describe the basics of algorithmic problem solving
- To develop programs in C using basic constructs.
- To develop programs in C using arrays and strings
- To develop applications in C using functions.
- To develop applications in C using Pointers, Structures, Union

LIST OF EXPERIMENTS

Exercise 1: Basics of C programming

a. Identification and solving of simple real life or scientific or technical problems, and developing flow charts and Pseudo code for the same (Electricity Billing, Retail shop billing)
b. Write a program to print sample strings like "hello world", "Welcome to C Programming" with different formats using escape sequences.
c. Write a Program to print different data types in "C" and their ranges.
d. Write a Program to initialize, assignment & printing variables of different data types.

Exercise 2: Operators

a. Write a Program to demonstrate arithmetic, logical and relational operators.
b. Write a Program to demonstrate pre increment and post increment (++a, a++), pre decrement and post decrement (--a, a--)
c. Write a Program to read radius value from the keyboard and calculate the area of circle and print the result in both floating and exponential notation.
d. Write a Program to calculate simple interest.
e. Write a Program to convert temperature from Fahrenheit –Centigrade and vice-versa.

Exercise 3: Control Statements

a. Write a Program to read marks of a student in six subjects and print whether pass or Fail. (using if-else).
b. Write a Program to calculate roots of quadratic equation.
c. Write a Program to calculate electricity bill. Read starting and ending meter reading. The charges are as follows.

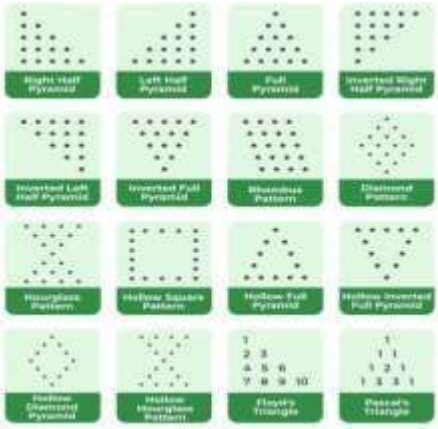
Usage Slab(in Units)	**Rate per unit(Rs)**
Upto 400	4.80
401-500	6.45
500-600	8.55
601-800	9.65
800-1000	10.70
>1000	11.80

d. Write a Program to perform arithmetic operations using case control statement.
e. Write a Program to display names of days in a Week using case control statement.

Exercise 4: Looping operations

a. Write a program to calculate sum of individual digits of a given number.
b. Write a program to check whether given number is palindrome or not.
c. Write a program to print prime numbers in the given range.
d. Write a program to print the Fibonacci series for given "N" value.

e. Write a program to print the following formats.



Exercise 5: 1-D and 2-D arrays

a. Write a program to store 10 elements in a 1-D array and print sum of the array, maximum and minimum element in an array.
b. Write a program to count no. of positive numbers, negative numbers and zeros in an array.
c. Write a program to count all subsets of given array with sum equal to given sum.
d. Write a program to search an element using linear search algorithm.
e. Write a program to sort the given elements using bubble sort algorithm.
f. Write a program to perform matrix addition, subtraction and multiplication.

Exercise 6: Strings

a. Write a program to perform various string manipulations using built-in functions.
b. Write a program to verify the given string is palindrome or not.
c. Write a program to Check if two strings are anagrams of each other.
d. Write a program to concatenate two strings using arrays.
e. Write a program to print the given strings in ascending order.

Exercise 7: Non recursive and recursive functions

a. Write an application to simulate basic calculator (+, -, *, /) using functions.
b. Write a program to find nth Fibonacci number using recursive and non-recursive number.
c. Write a program to find factorial of a number using recursive and non-recursive number.
d. Write a program to swap two numbers using Call by Value and Call by Reference.

Exercise 8: Pointers

a. Write a program to illustrate Pointers to array, strings, Pointers to Pointers, Array of Pointers
b. Write a program to sort an array using pointers.
c. Write a program to perform matrix multiplication using pointers.

Exercise 9: Structures and Union

a. Write a program to create structure for an account holder in a bank with following Fields: name, account number, address, balance and display the details of "n" account holders.
b. Write a program to find total marks of individual student and average marks for "n" students using structures.
c. Write a program to illustrate the functions of union.

Mini project

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Develop algorithmic solutions to simple computational Problems using flow chart and Pseudo code

CO2: Develop simple applications using basic C components.

CO3: Solve applications adopting array and string concepts in C.

CO4: Construct and implement applications in C using functions and pointers.

CO5: Make use of Structures and Union concepts to prepare applications in C.

CO-PO-PSO Mapping

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

EM25CO1	ENGINEERING PRACTICES LABORATORY *(Common to B.E. Civil, CSE, CSE(CS), EEE, EE(VLSI), Mech and B.Tech. IT Programmes)*	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To draw pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.
- To demonstrate the basic switch board wiring, fluorescent lamp wiring and stair case wiring using various electrical components.
- To choose various joints in steel plates using arc welding work and machining various simple processes like turning, drilling, tapping in parts
- To build a tray out of metal sheet using sheet metal work.
- To develop electronic circuit and testing for soldering and desoldering using PCB board.

LIST OF EXPERIMENTS:

GROUP – A

PART – I

PLUMBING WORK:

- Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household using Power Tools.

WOOD WORK:

- Planning and Making Dovetail joint.

CENTRIFUGAL PUMP:

- Assembly and Dismantling of Centrifugal pump.

AIR-CONDITIONER:

- Trouble shooting of AC

MODERN MANUFACTURING:

- Laser engraving and 3D printing* - Demo

ROBOTICS:

- Application of Robot In Automation* - Demo

PART – II

CYCLE I

- Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
- Staircase wiring
- Energy meter wiring and related calculations calibration
- Roof top solar panel connection and EV connection
- Study of BLDC Fan.

GROUP – B

PART - III

MECHANICAL ENGINEERING PRACTICES

WELDING WORK:

- Welding of Butt Joints using arc welding.

- Robot welding* (Demo)

BASIC MACHINING WORK:

- Facing and Turning*. (Demo)

SHEET METAL WORK:

- Making of a rectangular tray

AUTOMOBILE:

- Mantling and dismantling of Tyre‟s for 4 wheeler.
- Assembly and disassembly of Bearing.

PART- IV

CYCLE II

- Construction of series and parallel circuits using resistors.
- Measurement of resistance to earth of electrical equipment.
- Introduction of electronic components (Resistance, Capacitor, Diode, BJT, UJT, SCR, JFET)
- Soldering Simple electronic Circuits and Checking Continuity
- Generation of Signals (DSO, Function generator).

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Build various plumbing joints

CO2: Develop various carpentry joints.

CO3: Construct various wiring electrical joints in common household electrical wire work

CO4: Construct various welded joints, sheet metal and basic machining operations

CO5: Develop the electronic circuit for soldering

CO-PO-PSO Mapping

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

SEMESTER II

EN25C02	ENGLISH PROFICIENCY AND SOFT SKILLS *(Common to B.E. Civil, CSE, EEE, CSE(CS), EE(VLSI) and B.Tech. IT, AI&DS Programmes)*	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES :

The course enables the students to:

- Strengthen LSRW (Listening, Speaking, Reading, Writing) competencies in English.
- Demonstrate effective communication skills in meeting academic requirements.
- Integrate and interpret graphical data in logical writing using verbal reasoning.
- Produce formal writings for effective internal and external communication.
- Present and adapt concepts according to the target audience, fostering essential soft skills.

UNIT I	INTRODUCTION TO COMMUNICATION PROFICIENCY	6

Listening: Listening to native speaker's Telephone Conversations; **Speaking:** Sharing Childhood Experiences, dialogues (Informal & Formal), Talking about Favorite Personalities; **Reading:** Technical texts from - Newspapers /websites, Job Advertisements - Telephone Phrases; **Writing:** Statements - Issue based writing instructions - Checklist; **Grammar:** Error Spotting; **Vocabulary:** Misspelt Words; **Soft Skills:** Leadership Skills.

UNIT II	TECHNICAL TALKS AND TEAM DYNAMICS	6

Listening: Listening to Technical Talks, Scientific Lectures and Short Conversations; **Speaking:** Career choice, describing recent innovation in Technology; **Reading:** Speed reading - Identifying the various transitions in a text - Paragraphing; **Writing:** Precis writing - Letter of Enquiry, Quotation, Order, Claim and Adjustment Letters- Response to complaints; **Grammar:** Numerical Adjectives, Active & Passive Voice, Use of Impersonal Passive form; **Vocabulary:** Idioms & Phrases, Jumbled sentences; **Soft Skills:** Teamwork.

UNIT III	CAREER INSIGHTS AND DECISION MAKING	6

Listening: Job Interviews, Interview Skills, FAQs - Sports Commentaries/Animated stories/Anecdotes / Event narration; **Speaking:** Interviewing Celebrities and Entrepreneurs; **Reading:** Short stories - Critical reading; **Writing:** Cover Letter & Resume, Project Proposal writing; writing using AI tools **Grammar:** Embedded sentences; **Vocabulary:** Foreign words used in English(from other languages); **Soft Skills:** Decision Making.

UNIT IV	PROFESSIONAL WRITING AND ANALYTICAL SKILLS	6

Listening: TED Talks; **Speaking:** Presentation Skills; **Reading:** Developing dnalytical skills - Company profiles; **Writing:** Writing Statement of Purpose (SOP)-Emails, Memos, Notices and Circulars, Internship Application Letters; **Grammar:** Punctuation, If Conditionals; **Vocabulary:** Adjectives - Verbal reasoning; **Soft Skills:** Time Management.

UNIT V	ART OF REPORTING AND PANEL DISCUSSIONS	6

Listening: Model debate and reviewing the performance of each participant - Panel discussion; **Speaking:** Group communication-Discussing social issues, current affairs and debate; **Reading:** Fitting sentences in a paragraph - Cause and Effect Essays, Technical papers and case studies; **Writing:** Accident Report and Feasibility Report, Minutes of the Meeting; **Grammar:** Cause and Effect expressions , Reported speech; **Vocabulary:** Verbal Analogies; **Soft Skills:** Conflict Resolution.

PRACTICAL COURSE		
PRACTICAL SYLLABUS	**INTRA PERSONAL, INTERPERSONAL, ORGANIZATIONAL AND MASS COMMUNICATION**	**15**

Listening: Listening to TED Talks and Practice Exercises - Making a Critical Appreciation of Video Content - Answering Cloze Test Based on Listening.

Speaking: Self-Introduction-Introducing Resource Persons and Chief Guests - Developing Stories Using Picture Prompts - Language Etiquette in Different Situations - Expressing Agreement and Conflict Management and Seeking Information - Expressing Feelings - Affection, Anger, Regret etc.

- Team Reviewing and Appraisal on any Social Event, Short Talk on Technical Topics.

Reading: Making Inference in Reading - Reading Longer Texts with Time Frame - Reading and Interpreting Data using different types of Texts, Magazines and Internet Materials - Editing/Proofreading - Reading Research Papers.

Writing: Abstract Writing - Mind Mapping and Brainstorming on any Social Event/Issue - Creating a Product Review Blog, Making Powerpoint Presentations (MS Power point & Google Slides) and Creating PPT using AI tools.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Demonstrate improved LSRW competencies in English.
CO2: Exhibit enhanced academic communication skills.
CO3: Integrate graphical data into logical writing.
CO4: Compose formal documents for communication.
CO5: Adapt and present concepts to diverse audiences with the usage of soft skills.

TEXT BOOKS:

1. Gangalakshmi, C, Rathika, B, Saranraj, L, "Professional English for Engineers", New Delhi: Cengage, 2022.
2. Shoba K. N. and Lourdes Joavani Rayen, "Communicative English", Cambridge University Press, Cambridge, 2021.
3. Raymond Murphy, "Intermediate English Grammar", Cambridge University Press, New Delhi, 2020.

REFERENCES:

1. Raman, Meenakshi and Sangeetha Sharma, "Communication Skills", New Delhi: OUP, 2018.
2. R.C.Sharma Krishna Mohan, "Business Correspondence and Report Writing a Practical Approach to Technical Communication", McGraw Hill India (2017).
3. Jawahar, Jewelcy & Rathna.P, "Communicative English Workbook", VRB Publishers Pvt Ltd. Chennai. 2018.

WEBSITE RESOURCES:

1. Open Online Repositories from Oxford/ Cambridge/ British Council/ Voice of America
2. https://www.youtube.com/@TEDx
3. https://youtu.be/dzR4E49zNLI?si=0RL4C_vV1i1Kz2iR
4. AI tools : www.magicschool.ai, www.typeset.io, www.gamma.app, www.veed.io

CO-PO-PSO Mapping

CO		PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
		K-Level	K3	K4	K5	K5	K6	K3	K2	K3	K3	K2	K3
CO1	Demonstrate improved LSRW competencies in English	K2	_	_	_	_	_	1	1	2	3	-	2
CO2	Perform enhanced academic communication skills.	K3	_	_	_	_	_	-	2	2	3	-	2
CO3	Analyze graphical data to develop logical written content.	K4	_	_	_	_	_	1	1	1	3	-	2
CO4	Compose formal documents for communication.	K5	_	_	_	_	-	1	2	2	3	-	2
CO5	Evaluate concepts for diverse audiences using appropriate soft skills.	K5	_	_	_	_	-	1	2	2	3	-	2
Course Contribution													

MA25205	NUMERICAL METHODS AND STATISTICAL ANALYSIS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES :

- To extend and formalize knowledge of the theory of probability
- To develop the information of testing of hypothesis for small and large samples in real life problems.
- To make use of the basic concepts of solving algebraic and transcendental equations and numerical techniques of integration in Engineering and Technology disciplines.
- To apply various techniques of Numerical methods for solving ordinary differential equations.
- To determine the solutions of Partial Differential equations using various Numerical techniques.

UNIT I	PROBABILITY	12

Introduction-Sample Spaces and Events-Axioms of Probability-Interpretations and Properties of Probabilities - Conditional Probabilities – Baye's theorem- Independence.

UNIT II	TESTING OF HYPOTHESIS	12

Large sample test based on Normal distribution for single mean and difference of means – Tests based on t, $\chi 2$ and F distributions for testing means and variances – Contingency table (Test for Independency) – Goodness of fit.

UNIT III	SOLUTION OF EQUATIONS AND NUMERICAL INTEGRATION	12

Newton Raphson method – Solution of linear system of equations: Gauss elimination method – Pivoting – Gauss Jordan method – Gauss Seidel method – Numerical integration by Trapezoidal and Simpson‟s rule.

UNIT IV	NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS	12

Taylor's series method – Euler's method – Modified Euler's method – Fourth order Runge-Kutta method for solving first order equation – Milne‟s Predictor and Corrector method – Adam's Bashforth predictor – corrector method for solving first order equation.

UNIT V	BOUNDARY VALUE PROBLEMS IN PARTIAL DIFFERENTIAL EQUATIONS	12

Finite difference techniques for the solution of two dimensional Laplace and Poisson equations on rectangular domain – One dimensional heat flow equation by explicit method – One dimensional wave equation by explicit method.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Apply the concepts of Probability in various real life problems.

CO2: Explain the test of hypothesis for small and large samples by using various test like t-test, F-test, Z-test and $\chi 2$ test.

CO3: Apply a suitable method to solve algebraic and transcendental equations.

CO4: Apply various techniques and methods for solving first and second order ordinary differential equations.

CO5: Solve the partial differential equations with initial and boundary conditions by using suitable techniques .

TEXT BOOKS:

1. Grewal.B.S. "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2018.
2. JAY.L. Devore, "Probability and Statistics for Engineering and the Science", 9th Edition, Cengage Learning, 2016.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis", 7th Edition, Pearson Education, Asia, New Delhi, 2008.

REFERENCES:

1. S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 12th Edition, Sultan Chand & Sons, 2020.
2. Chapra. S.C. and Canale. R.P, "Numerical Methods for Engineers", 7th Edition, Tata McGraw Hill, New Delhi, 2015.
3. S.K.Gupta, "Numerical Methods for Engineers", 7th Edition, New age International private Ltd publishers, 2015.

CO-PO-PSO Mapping

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

PH25204	APPLIED PHYSICS FOR VLSI ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To infer the importance of studying electrical properties of materials.
- To summarize the knowledge of semiconductor physics.
- To gain knowledge on oxidation and diffusion.
- To outline the importance of epitaxy and lithography.
- To understand the fabrication techniques of implantation and etching.

UNIT I	ELECTRONIC STATES	9

Quantum free electron theory - Fermi distribution energy - Density of energy states - Electron in a periodic potential - Energy bands in solids -Conductors - Semiconductors - Insulators - Electron effective mass - the concept of hole - properties of conduction and valence bands.

UNIT II	CARRIERS AND DOPING	9

Intrinsic concentration - intrinsic Fermi level - n and p type doping - density of carriers in extrinsic semiconductors and their temperature dependence - extrinsic semiconductor Fermi energy level - degenerate and non - degenerate semiconductors - Direct and Indirect band gap semiconductors - Hall Effect - Schottky junction - Ohmic contacts - Schottky diode.

UNIT III	OXIDATION AND DIFFUSION	9

Introduction - Thermal oxidation - Kinetics of Thermal oxidation - Film deposition - Poly silicon deposition - Diffusion Mechanics - Diffusion equation - Diffusion profile - Diffusion in SiO2 - Dopant diffusion occurs by both current and voltage.

UNIT IV	EPITAXY AND LITHOGRAPHY	9

Vapour phase epitaxy - Liquid phase epitaxy - Molecular beam epitaxy - Optical lithography - Epitaxial defects - Epitaxial evaluation - Electron lithography - X-ray lithography - Ion beam lithography.

UNIT V	IMPLANTATION AND ETCHING	9

Implantation mechanism - Range theory - shallow junction - Ion implantation system - High energy implantation - Low energy implantation - Etching - Wet chemical etching - Dry physical etching - Reactive plasma etching - Etching induced damage – cleaning.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Express knowledge of the electrical properties of materials.
CO2: Recognize the importance of carrier concentration and doping in semiconductors.
CO3: Acquire knowledge about oxidation and diffusion.
CO4: Understand Epitaxy and Lithography techniques.
CO5: Impart in-depth knowledge about implantation and etching

TEXT BOOKS:

1. R.F.Pierret, “Semiconductor Device Fundamentals”, 1st Edition (Indian Edition) Pearson, 2006.
2. S.M.Sze, “VLSI Technology”, 2nd Edition (Indian Edition), Mc Graw Hill,2013.
3. Dr.Sujata Pandey, “VLSI Design”, 1st Edition, Dhanpat Rai & Co., 2006.

REFERENCES:

1. Jasprit Singh, “Semiconductor Devices Basic Principles”, 1st Edition (Indian Edition), Wiley, 2007.
2. Sorab K Ghandhi, “VLSI Fabrication Principles”, 2nd Edition,Wiley, 2008.

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
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	-
Course Contribution	2	1	-	-	-	-	-	-	1	-	-	1	-

CH25C02	ENVIRONMENTAL SCIENCE *(Common to all B.E./B.Tech. Programmes)*	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES :

- To appreciate the structure and function of an ecosystem and biodiversity
- To realize the environmental impacts of natural resources.
- To recognize causes, effects and control measures of different types of pollution.
- To comprehend the importance of disaster management, environmental ethics and values.
- To appreciate the relevance of the environment by evaluating its impact on the surrounding environment and its functions.

UNIT I	ENVIRONMENT, ECOSYSTEM AND BIODIVERSITY	6

Definition, scope and importance of environment – need for public awareness - ecosystem- general structure and function of an ecosystem- ecological succession-biodiversity-types-values of biodiversity- endangered and endemic species-red data book- hot spots of biodiversity-criteria- hot spots in India-threats to biodiversity(man-animal conflicts, habitat loss, poaching) - case studies - conservation of biodiversity- in-situ and ex-situ conservation – case studies for conservation of biodiversity in Mudumalai.

UNIT II	NATURAL RESOURCES AND ITS ENVIRONMENTAL IMPACTS	6

Natural resources-forest resource-ecological functions – causes, effects and control measures of deforestation-water resource-sources-conflict over water-dams benefits and problems-food resource- overgrazing- impacts of over grazing- impacts of modern agriculture-Energy Resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternative energy sources, - wind mills and solar panels- case studies.

UNIT III	ENVIRONMENTAL POLLUTION AND CONTROL	6

Air pollution-causes, effects and control methods - water pollution- causes, effects-waste water treatment-soil pollution-causes, effects -solid waste management - causes, effects and management - E- waste: composition and generation of E-waste pollutants, hazardous properties, Effects of pollutant on human health and environment, domestic E- waste disposal, Basic principles of E waste management, Component of E-waste management. Pollution control acts -
air, water- wildlife - E- waste management rules - case studies - role of an individual in control of pollution.

UNIT IV	DISASTER MANAGEMENT AND ENVIRONMENTAL ETHICS	6

Disaster management-causes, effects and management of- flood, landslide, earthquake and tsunami- case studies- environmental ethics - value education-traditional value systems in India-water conservation-rain water harvesting-watershed management.

UNIT V	SUSTAINABLE MANAGEMENT AND PRACTICES	6

Social issues - climate change - causes, effects and control measures - global warming - causes, effects and control measures - Acid rain - causes, effects and control measures - ozone layer depletion - causes, effects and control measures - nuclear accident and holocausts – Sustainability - concept, needs and challenges - economic, social and aspects of sustainability - from unsustainability to sustainability - EIA - Sustainable development – goals, target - green buildings - ISO 14000 series.

TOTAL : 30 PERIODS

COURSE OUTCOMES:

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

CO1: Elucidate the concept, structure and function of an ecosystem and biodiversity.
CO2: Demonstrate the environmental impressions of natural resources.
CO3: Illustrate the appropriate management approach for pollution control.
CO4: Practice the proper way of managing disaster with environmental ethics.
CO5: Assess the impact of the environment on humans, and consider its roles and worth.

TEXT BOOKS:

1. A. Kaushik, and C. P. Kaushik. "Environmental Science and Engineering", 6th Edition, New Age International, 2018.
2. S. K. Garg and K. Garg, "Ecological and Environmental studies", Khanna Publishers, 2015.
3. Wright and Nebel, "Environmental science towards a sustainable future", 12th Edition, Prentice Hall of India Ltd, 2015.

REFERENCES:

1. Erach Bharucha, "Text book of Environmental studies for Undergraduate courses", 3rd Edition, UGC, 2021.
2. P. Ravi, and Agrahari, " Environmental ecology, Biodiversity, climatic change & Disaster management", 1st Edition, McGraw Hill, 2020
3. Benney Joseph, "Environmental Science and Engineering", 1st Edition, McGraw Hill Education (India) Pvt Ltd, New Delhi, 2017.

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	-	-	-	2	1	-	-	1	1	-	-
CO2	1	1	-	-	-	2	1	-	-	-	1	-	-
CO3	-	1	-	-	-	2	-	-	-	-	-	1	-
CO4	-	1	1	-	-	2	2	-	-	1	1	1	-
CO5	-	1	1	-	-	2	2	-	-	1	1	-	-
Course Contribution	**1**	**1**	**1**	**-**	**-**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**

VD25101	SEMICONDUCTOR DEVICES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To explain about basic semiconductor diodes, their characteristics and applications
- To impart knowledge on different configurations and models of bipolar junction transistors
- To demonstrate the construction and working principle of field effect transistors
- To infer the operations of special semiconductor devices
- To interpret the theory, construction and operation of power and display devices

UNIT I	BASIC SEMICONDUCTOR DIODES	9

PN Junction Diode, Current equations, Energy band diagram, Diffusion and Drift current densities, Forward and Reverse bias characteristics, Transition and Diffusion capacitances, Switching characteristics, Breakdown in PN Junction Diodes, Zener diode, Varactor diode, Tunnel diode.

UNIT II	BIPOLAR JUNCTION TRANSISTORS	9

NPN -PNP -Operations - Early effect - Current equations – Input and Output characteristics of CE,CB, CC - Hybrid -π model - h-parameter model, Ebers Moll model.

UNIT III	FIELD EFFECT TRANSISTORS	9

JFETs – Drain and Transfer characteristics - Current equations - Pinch off voltage and its significance – MOSFET - Characteristics - Threshold voltage - Channel length modulation, D-MOSFET, E-MOSFET- Characteristics – Comparison of MOSFET with JFET.

UNIT IV	SPECIAL SEMICONDUCTOR DEVICES	9

Metal semiconductor junction - MESFET, Multigate transistors - Double Gate FINFET, DUAL GATE MOSFET, Gate and Channel Engineering, Carbon nanotubes and Carbon nanowires, Schottky barrier diode, LASER diode and LDR.

UNIT V	POWER DEVICES AND DISPLAY DEVICES	9

UJT, SCR, DIAC, TRIAC, Power BJT- Power MOSFET, LED, LCD, Photo transistor, Opto coupler, Solar cell and CCD.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Explain the operation and characteristics of semiconductor diode
CO2: Outline the construction and working of bipolar junction transistors
CO3: Explain the construction and characteristics of field effect transistors devices
CO4: Summarize the working principles of special semiconductor devices
CO5: Illustrate the construction and working of power & display devices

TEXT BOOKS:

1. Donald A Neaman, “Semiconductor Physics and Devices”, 4th Edition, Tata McGraw Hill, 2012.
2. Salivahanan. S, Suresh Kumar. N, Vallavaraj. A, “Electronic Devices and Circuits”, 3rd Edition, Tata McGraw-Hill, 2008.
3. David A. Bell, "Electronic Devices and Circuits", 5th Edition, Oxford Higher Education Press, 2010.

REFERENCES:

1. Robert Boylestad and Louis Nashelsky, "Electron Devices and Circuit Theory", 10th Edition, Pearson Prentice Hall, July 2008.
2. R. S. Sedha, "A Text Book of Applied Electronics", 24th Edition, S. Chand Publications, 2006.
3. Yang, "Fundamentals of Semiconductor Devices", 1st Edition, McGraw Hill International Edition, 1978.

CO-PO-PSO Mapping

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

VD25102	CIRCUITS AND NETWORK THEORY	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES :

- To infer about circuit analysis for DC circuits
- To infer about circuit analysis using network theorems for DC circuits
- To outline the basic concepts and behavior of AC circuits
- To understand about series and parallel resonance circuits
- To determine circuit parameters using two port networks

UNIT I	PRINCIPLES OF CIRCUIT ANALYSIS	12

Basic components of Electric circuits, Charge, Current, Voltage and Power, Voltage and Current sources, Ohms law, Kirchhoff‟s current law, Kirchhoff‟s voltage law, The single Node – Pair circuit, Series and Parallel connected independent sources, Resistors in series and parallel, Voltage and Current division, Nodal analysis and Mesh analysis, Source transformation, Star/Delta and Delta /Star transformations, Mesh analysis, Node analysis

UNIT II	NETWORK THEOREMS	12

Circuit analysis techniques - Linearity and Superposition, Thevenin and Norton equivalent circuits, Maximum Power Transfer, Reciprocity, Milman‟s theorem, Delta-Wye conversion, Duality, Dual circuits, Analysis using dependent current sources and voltage sources

UNIT III	AC CIRCUIT ANALYSIS	12

Basic RL , RC and RLC circuits ,Series AC circuits: R-L, R-C and R-L-C circuits, impedance, reactance, phasor diagram, impedance triangle, power factor, active(real)power, apparent power, reactive power, power triangle. AC Series circuit by using complex algebra, Parallel AC circuits: Resistance in parallel with pure inductance and capacitance, series combination of resistance and inductance in parallel with capacitance

UNIT IV	RESONANCE IN SERIES AND PARALLEL CIRCUITS	12

Impedance and phase angle of a series and parallel resonant circuits, Voltage and current in a series and parallel resonant circuits, Resonance in Series RLC vs Parallel RLC, Quality factor in series and parallel resonance, Magnification in series and parallel resonance circuits

UNIT V	TWO PORT NETWORKS	12

Significance of two port network, Open circuit (Z) and short circuit(Y) parameters, Series Connection and Parallel Connection of Two-Port Networks Transmission parameters, T and π representation of circuits, Reciprocal and symmetrical two port networks.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Make use of the basic voltage and current laws for analysis of DC circuits
CO2: Compare resonance of RLC circuits in series and parallel connections
CO3: Analyze the parameters of AC circuits
CO4: Select suitable network theorems to analyze DC circuits
CO5: Solve the various parameters of two port networks

TEXT BOOKS:

1. Joseph Edminister and Mahmood Nahvi, "Electric Circuits, Schaums Outline Series", 5th Edition, Tata McGraw Hill Publishing Company, New Delhi, Reprint 2016.
2. Hayt Jack Kemmerly and Steven Durbin, "Engineering Circuit Analysis", 9th Edition, Mc Graw Hill, 2018.
3. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", 2nd Edition, Mc Graw - Hill, 2003.

REFERENCES:

1. Robert.L. Boylestead, "Introductory Circuit Analysis", 12th Edition, Pearson Education India, 2014.
2. David Bell, "Fundamentals of Electric Circuits", 7th Edition, Oxford University press, 2009.
3. John O Mallay, "Basic Circuit Analysis", 2nd Edition, Schaum"s Outlines, Mc Graw Hill, 2011.
4. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", 5th Edition, Cengage Learning, 1st Indian Reprint 2013.

CO-PO-PSO Mapping

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

TA25C02	TAMILS AND TECHNOLOGY *(Common to all B.E./B.Tech. Programmes)*	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 Period - 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 Period, 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. கே.கே. பிள்ளை, "தமிழேவரலாறு – மேேலும் பண்பாடும்", தமிழ்நாடு பாடநூல் மற்றும் ேல்வியியல் பணிேள் ேழேம்.
2. முளைவர் இல. சுந்தரம், "ேணிைித்தமிழ்", விேைட் பிரசுரம்.
3. "கீழடி – ளவளேநதிேேளரயில் சங்ேேோல நேர நாேரிேம்", ததால்லியல் Fளற தவளியீடு.
4. "தபாருளந – ஆற்றங்ேளர நாேரிேம்", ததால்லியல் Fளற தவளியீடு.
5. Dr.K.K.Pillay , "Social Life of Tamils", A joint publication of TNTB & ESC and RMRL – (in print).
6. Dr.S.Singaravelu, "Social Life of the Tamils - The Classical Period", International Institute of Tamil Studies.
7. Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu, " Historical Heritage of the Tamils", International Institute of Tamil Studies.
8. Dr.M.Valarmathi, "The Contributions of the Tamils to Indian Culture", International Institute of Tamil Studies.
9. Keeladi, " Sangam City Civilization on the banks of river Vaigai", Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
10. Dr.K.K.Pillay, "Studies in the History of India with Special Reference to Tamil Nadu".
11. Porunai Civilization, "Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation", Tamil Nadu.
12. R.Balakrishnan, "Journey of Civilization Indus to Vaigai", RMRL.

TA25C02	தமிழரும் மதொழில்நுட்பமும்	L	T	P	C
		1	0	0	1

அலகு 1	மநசவு மற்றும் பொறனத் மதொழில்நுட்பம்	3

சங்ே ோலத்தில் தநசவுத் ததாழில் – பாளைத் ததாழில்நுட்பம் - ேருப்பு சிவப்பு பாண்டங்ேள் – பாண்டங்ேளில் கீறல் குறியீடுேள்.

அலகு 2	வடிவறமப்பு மற்றும் கட்டிடத் மதொழில்நுட்பம்	3

சங்ே ோலத்தில் வடிவளமப்பு மற்றும் ேட்டுமாைங்ேள் & சங்ே ோலத்தில் வீட்டுப்தபாருட்ேளில் வடிவளம ப்பு- சங்ே ோலத்தில் ேட்டுமாை தபாருட்ேளும் நடுேல்லும்– சிலப்பதிோரத்தில் கமளட அளமப்பு பற்றிய விவரங்ேள் – மாமல்லபுரச் சிற்பங்ேளும், கோவில்ேளும் – கசாழர் ோலத்Fப் தபருங் கோயில்ேள் மற்றும் பிற வழிபாட்டுத் தலங்ேள் – நாயேர் ோலே கோயில்ேள் - மாதிரி ேட்டளமப்புேள் பற்றி அறிதல், மFளர மீைாட்சி அம்மை ஆலயம் மற்றும் திருமளல நாயேர் மஹால் – தசட்டிநாட்டு வீடுேள் – பிரிட்டிஷ்
ோலத்தில் தசைளையில் இந்கதா -சாகராதளைிோ் ேட்டிடே் ேளல.

அலகு 3	உற்பத்தித் மதொழில்நுட்பம்	3

ேப்பல் ேட்டும் ேளல – உகலாேவியல் – இரும்புத் ததாழிற்சாளல – இரும்ளப உருோ்குதல், எஃகு – வரலாற்றுச் சாை்றுேளாே தசம்பு மற்றும் தங்ே நாணயங்ேள் – நாணயங்ேள் அச்சடித்தல் – மணி உருவாோ்கும் ததாழிற்சாளலேள் – ேல்மணிேள், ேண்ணாடி மணிேள் – சுடுமண் மணிேள் – சங்கு மணிேள் – எலும்புத்Fண்டுேள் – ததால்லியல் சாை்றுேள் – சிலப்பதிோரத்தில் மணிேளிை் வளேேள்.

அலகு 4	கவளொை்றம மற்றும் நீர்ப்பொசனத் மதொழில்நுட்பம்	3

அளண , ஏரி, குளங்ேள், மதகு – கசாழர் ோலே குமுழித் தூம்பிை் முோ்கியத்Fவம் – ோல்நளட பராமரிப்பு – ோல்நளடேளுோ்ோோே வடிவளமேப்பட்ட கிணறுேள் – கவளாண்ளம மற்றும் கவளாண்ளமச் சார்ந்த தசயல்பாடுேள் – ேடல்சார் அறிவு – மீை்வளம் – முத்F மற்றும் முத்Fோ்குளித்தல் – தபருங்ேடல் குறித்த பண்ளடய அறிவு – அறிவுசார்சமூேம்.

அலகு 5	அறிவியல் தமிழ் மற்றும் கைித்தமிழ்	3

அறிவியல் தமிழிை் வளர்ச்சி – ேணித்தமிழ் வளர்ச்சி - தமிழ் நூல்ேளள மிை் பதிப்பு தசய்தல் – தமிழ் தமைதபாருட்ேள் உருவாோ்ேம் – தமிழ் இளணயே ேல்விோ்ேழேம் – தமிழ் மிை்நூலேம் –
இளணயத்தில் தமிழ் அேராதிேள் – தசாற்குளவத் திட்டம்.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. கே.கே. பிள்ளள, “தமிழேவரலாறு – மே்ேளும் பண்பாடும்”, தமிழ்நாடு பாடநூல் மற்றும் ேல்வியியல் பணிேள் ேழேம்.
2. முளைவர் இல. சுந்தரம், “ேணிளைித்தமிழ்”, விேளைட் பிரசுரம்.
3. “கீழடி – ளவளேநதிே்ேளரயில் சங்ேோல நேர நாேரிேம்”, ததால்லியல் Fளற தவளியீடு.
4. “தபாருளந – ஆற்றங்ேளர நாேரிேம்”, ததால்லியல் Fளற தவளியீடு.
5. Dr.K.K.Pillay , “Social Life of Tamils”, A joint publication of TNTB & ESC and RMRL – (in print).
6. Dr.S.Singaravelu, “Social Life of the Tamils - The Classical Period”, International Institute of Tamil Studies.
7. Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu, “Historical Heritage of the Tamils”, International Institute of Tamil Studies.
8. Dr.M.Valarmathi, “The Contributions of the Tamils to Indian Culture”, International Institute of Tamil Studies.
9. Keeladi, “Sangam City Civilization on the banks of river Vaiga”, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
10. Dr.K.K.Pillay, “Studies in the History of India with Special Reference to Tamil Nadu”.
11. Porunai Civilization, “Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation”, Tamil Nadu.
12. R.Balakrishnan, “Journey of Civilization Indus to Vaigai”, RMRL.

PC25C01	PHYSICS AND CHEMISTRY LABORATORY *(Common to all B.E./B.Tech Programmes)*	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES :

- To explain the proper use of various kinds of laboratory equipment.
- To extend how data can be collected, presented and interpreted in a clear and concise manner.
- To infer problem solving skills and interpretation of experimental data.
- To summarize error in experimental measurements and techniques used to minimize such error.
- To translate the student as an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS: PHYSICS LABORATORY

1. Laser- Determination of the wavelength of the laser using grating. (Common to ALL)
2. Photoelectric effect – Determination of Planck‟s constant. (Common to ALL)
3. Hall effect – determination of Hall parameters. (Common to ALL)
4. a) Optical fibre -Determination of Numerical aperture and acceptance angle.
   b) Compact disc- Determination of width of the groove using the laser. (Common to CSE,IT, AI&DS,CS(Cyber),ECE,EEE,EE(VLSI))
5. Spectrometer-Determination of the wavelength of light using grating. (Common to CSE,IT, AI&DS,CS(Cyber),ECE,EE(VLSI))
6. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects. (Common to CIVIL,EEE,MECH)
7. Determination of Young‟s modulus–cantilever method. (Common to CIVIL,MECH)

LIST OF EXPERIMENTS: CHEMISTRY LABORATORY (Any 7 experiments)

1. Determination of chloride content of water sample by Argentometric method.
2. Determination of total hardness of water by EDTA method.
3. Determination of strength of acids in a mixture of acids using conductivity meter.
4. Conductometric titration of strong acid against strong base.
5. Determination of DO content of water sample by Winkler‟s method.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Estimation of iron content of the given solution using potentiometer.
8. Conductometric titration of barium chloride against sodium sulphate. (precipitation titration)
9. Preparation of nanoparticles (TiO2/ZnO/CuO) by Sol-Gel method.
10. Determination of types and amount of alkalinity in water sample.

TOTAL : 30 PERIODS

COURSE OUTCOMES:

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

CO1: Apply the knowledge, to gain hands-on experience with laboratory equipment.
CO2: Relate the graphical models to interpret the laboratory data.
CO3: Interpret quantitative reasoning and describing physical reality.
CO4: Apply the principle and process to access the scientific information.
CO5: Translate students to solve problems individually and collaboratively.

REFERENCES:

1. “Physics Laboratory Manual”, Department of Physics, Velammal College of Engineering & Technology, Madurai (2021)
2. P. Mani, “Physics Laboratory”, Dhanam Publications, 3rd Edition 2021.
3. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, “Vogel‟s Textbook of Quantitative Chemical Analysis”, 2009.

*****Each class is divided into two batches (30 students / batch) and each batch will perform their experiments alternatively per week in physics and chemistry laboratories.

CO-PO-PSO Mapping

Course Outcomes(CO) At the end of the course, the learners will be able to	K-Level	Program Outcomes (PO)											Program Specific Outcomes (PSO)	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1: Apply the knowledge, to gain hands-on experience with laboratory equipment	K3	**3**	**2**	**-**	**-**	**1**	**1**	**-**	**1**	**1**	**-**	**1**	**1**	**-**
CO2: Relate the graphical models to interpret the laboratory data	K3	**3**	**2**	**-**	**-**	**1**	**1**	**1**	**1**	**1**	**-**	**-**	**1**	**-**
CO3: Interpret quantitative reasoning and describing physical reality	K3	**3**	**2**	**-**	**-**	**1**	**-**	**1**	**1**	**1**	**-**	**-**	**1**	**-**
CO4: Apply the principle and process to access the scientific information	K3	**3**	**2**	**-**	**-**	**1**	**1**	**-**	**1**	**1**	**-**	**1**	**1**	**-**
CO5: Translate students to solve problems individually and collaboratively	K3	**3**	**2**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**-**	**1**	**1**	**-**
Course Contribution		**3**	**3**	**2**	**-**	**-**	**1**	**1**	**1**	**1**	**-**	**1**	**1**	**-**

VD25103	DEVICES AND CIRCUIT ANALYSIS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES :

- To gain knowledge about KVL, KCL, Thevenin, Norton and Superposition theorems
- To study the transient analysis of RLC circuits
- To infer the characteristics of Diode
- To summarize the characteristics of BJT, FET and SCR
- To demonstrate the working principle of half wave and full wave rectifiers

LIST OF EXPERIMENTS:

1. Verification of KVL and KCL
2. Verification of Superposition theorem
3. Verification of Thevenin and Norton theorem
4. Verification of Maximum Power Transfer and Reciprocity theorem
5. Determination of Resonance frequency of series and parallel RLC Circuits
6. Verification of self and mutual inductance of coupled circuits using EDA tools
7. Characteristics of PN Junction diode and Zener diode
8. Common Emitter input-output Characteristics
9. Common Base input-output Characteristics
10. FET Characteristics
11. SCR Characteristics
12. Half-wave rectifier and Full-wave rectifier

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Build circuits to verify Kirchoff's laws and network theorems
CO2: Make use of RLC circuits to determine their frequency response
CO3: Examine the characteristics of PN and Zener diodes
CO4: Compare the characteristics of BJT, FET and SCR
CO5: Distinguish half wave rectifier with full wave rectifier

TEXT BOOKS:

1. Salivahanan. S, Suresh Kumar. N, Vallavaraj. A, "Electronic Devices and Circuits", 3rd Edition, Tata McGraw-Hill, 2008.
2. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", 2nd Edition, Mc Graw - Hill, 2003.

REFERENCES:

1. R. S. Sedha, "A Text Book of Applied Electronics", 24th Edition, S. Chand Publications, 2006.
2. David Bell, "Fundamentals of Electric Circuits", 7th Edition, Oxford University press, 2009.

CO-PO-PSO Mapping

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

SEMESTER III

MA25303	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To use various methods of Laplace transforms for solving various engineering problems.
- To explain Fourier series analysis which is essential for application problems in engineering.
- To demonstrate mathematical tools for solving partial differential equations that model several physical processes.
- To explore various Fourier transform techniques used in wide variety of situations.
- To develop Z transform techniques to solve difference equations for discrete time systems

UNIT I	LAPLACE TRANSFORMS	12

Laplace transform- conditions for existence –Transform of elementary functions –Basic properties – First shifting theorem –Transform of derivatives on $t\ f(t), f(t)/t$ and periodic functions- Transform of unit step function and impulse functions. Inverse Laplace transform by partial function method and convolution theorem (excluding proof)-Initial and finial value theorems-Solutions of linear ODE of second order with constant coefficients using Laplace transform techniques.

UNIT II	FOURIER SERIES	12

Dirichlet's conditions – General Fourier series odd and even functions – Half range sine series – half range cosine series – Parseval's identity – Harmonic Analysis.

UNIT III	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	12

Classifications of PDE – Solutions of one dimensional wave equations – one dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (excluding insulated edges).

UNIT IV	FOURIER TRANSFORMS	12

Statement of Fourier integral theorem – Fourier transform pair – Inverse Fourier transform -Fourier sine and cosine transform – Properties – Transforms of simple functions – convolution theorem – Parseval's identity.

UNIT V	Z- TRANSFORMS AND DIFFERENCE EQUATIONS	12

Z- Transform – Elementary properties – Inverse Z- Transform (Using partial fractions and residues) – Convolution theorem – Formation of difference equations – Solution of difference equations using Z-transforms.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1**:** Compute Laplace transform and inverse Laplace transform of different functions.

CO2: Expand the Fourier series for the given function in the given interval.

CO3: Classify the second order PDE and solve initial and final value problems.

CO4: Apply Fourier transform techniques to evaluate the given integral.

CO5: Solve the given difference equations using Z-transforms.

TEXT BOOKS:

1. Grewal.B.S. "Higher Engineering Mathematics", 45th edition, Khanna Publishers, New Delhi, 2024.
2. Kreyszig Erwin, "Advanced Engineering Mathematics ", 10th edition, John Wiley and Sons, New Delhi**,** 2020.

REFERENCES:

1. M.W. Wong, "Partial Differential Equations Topics in Fourier Analysis", 2nd edition, Chapman & Hall, 2024.
2. Peter V.O. Neil "Advanced Engineering Mathematics", 7th edition, Cengage, New Delhi, 2020.
3. Wylie C. R and Barret L. C, "Advanced Engineering Mathematics", 6th edition, Tata McGraw-Hill, New Delhi, 2019.

CO-PO-PSO Mapping

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

VD25201	DIGITAL SYSTEM DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To apply Boolean algebra and logic simplification for digital circuit design.
- To design combinational circuits using standard logic gates and modules.
- To develop synchronous sequential circuits using flip-flops.
- To analyze and design asynchronous sequential circuits.
- To explain the operation of semiconductor memories and programmable devices.

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 minimization, NAND and NOR implementations- Introduction to HDL.

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, Magnitude comparator, Decoder, Encoder and Priority Encoder-HDL Models of Combinational circuits.

UNIT III	SYNCHRONOUS SEQUENTIAL CIRCUITS	9

Flip flops – SR, JK, T, D, Master / Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design - state minimization, state assignment, circuit implementation – Design of Counters- Ripple counters, Ring counters, Shift registers and Universal shift register- HDL Models of Sequential Circuits.

UNIT IV	ASYNCHRONOUS SEQUENTIAL CIRCUITS	9

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

UNIT V	MEMORY DEVICES AND DIGITAL INTEGRATED CIRCUITS	9

Basic memory structure – ROM -PROM – EPROM – EEPROM , RAM – Static and dynamic RAM - Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) ,Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan- in, noise margin, logic families and their characteristics-RTL, TTL, ECL, CMOS.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Simplify Boolean expressions using algebraic and graphical techniques.
CO2: Design and implement combinational digital circuits using logic gates.
CO3: Design synchronous sequential circuits using flip-flops and counters.
CO4: Analyze asynchronous sequential circuits for race and hazard conditions.
CO5: Explain and compare semiconductor memories and programmable logic devices.

TEXT BOOKS:

1. M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", 6th Edition, Pearson Education, 2017.
2. S.Salivahanan and S.Arivazhagan, "Digital Electronics", 1st Edition, Vikas Publishing House Pvt Ltd, 2012.
3. Soumitra Kumar Mandal, "Digital Electronics", 1st Edition, McGraw Hill Education Private Limited, 2016.
4. J.Bhaskar-, "VHDL Primer", 1st Edition, Pearson Education Asia, 2001.

REFERENCES:

1. Charles H.Roth, "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
2. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011
3. A.Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, PHI Learning Private Limited, 2016.
4. Stephen Brown and Zvonko Vranesic, "Fundamentals of Digital Logic with VHDL Design", 1st Edition, McGraw-Hill Higher Education, 2009.

CO-PO-PSO Mapping

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

VD25202	ANALOG CIRCUITS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To analyze the operation of single-stage BJT amplifiers.
- To design and evaluate MOSFET amplifiers.
- To examine multistage and differential amplifier configurations.
- To explain the working principles of feedback amplifiers and oscillators.
- To analyze and design power amplifiers and DC–DC converters.

UNIT I	BJT AMPLIFIERS	9

Load line, operating point, biasing methods for BJT, BJT hybrid Π small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response – High frequency analysis- Introduction to PSPICE simulation.

UNIT II	MOSFET AMPLIFIERS	9

Load line, operating point, biasing methods for MOSFET, MOSFET hybrid Π small signal model – Analysis of CS, CG and Source follower – Gain and frequency response- High frequency analysis using PSPICE simulation.

UNIT III	MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER	9

Cascade Amplifier, Cascode amplifier, Differential amplifier – Common mode and Difference mode analysis –MOSFET input stages – tuned amplifiers – Gain and frequency response – Neutralization methods-CMRR measurement using PSPICE simulation.

UNIT IV	FEEDBACK AMPLIFIERS AND OSCILLATORS	9

Advantages of negative feedback – Voltage / Current, Series, Shunt feedback Amplifiers – Positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

UNIT V	POWER AMPLIFIERS AND CONVERTERS	9

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Analyze the characteristics and frequency response of single-stage BJT amplifiers. CO2: Design and evaluate MOSFET amplifiers with appropriate biasing techniques. CO3: Analyze multistage and differential amplifiers for performance characteristics. CO4: Design feedback amplifiers and oscillators for specific applications.

CO5: Analyze and design power amplifiers and DC–DC converter circuits.

TEXT BOOKS:

1. David A. Bell, "Electronic Devices and Circuits", 5th edition, Oxford Higher Education Press, 2010.
2. Robert L. Boylestad and Louis Nasheresky, “Electronic Devices and Circuit Theory”, 10th edition, Pearson Education, PHI, 2008.
3. Adel.S. Sedra, Kenneth C. Smith, "Micro Electronic Circuits", 7th Edition, Oxford University Press, 2014.

REFERENCES:

1. Donald.A. Neamen, "Electronic Circuit Analysis and Design", 3rd Edition, Tata McGraw Hill, 2010.
2. D.Schilling and C.Belove, "Electronic Circuits", 3rd Edition, McGraw Hill, 1989.
3. Muhammad H.Rashid, "Power Electronics", 3rd Edition, Pearson Education / PHI , 2004.

CO-PO-PSO Mapping

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

VD25203	INTEGRATED CIRCUIT DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To explain the fabrication process and construction of integrated circuits.
- To apply operational amplifiers in linear and nonlinear circuit design.
- To design and evaluate waveform generators, comparators, and converters using Op-Amps.
- To analyze special ICs such as 555 Timers, PLLs, and VCOs.
- To examine IC voltage regulators and power supply design.

UNIT I	INTEGRATED CIRCUIT FABRICATION	9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realization of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, Field Effect Transistors (FETs) and Photo Voltaic (PV) Cell.

UNIT II	OPERATIONAL AMPLIFIER CHARACTERISTICS AND APPLICATIONS	9

Ideal Operational amplifier of characteristics, DC characteristics and AC characteristics, differential amplifier; frequency response of Op-Amp-Basic applications of Op-Amp - Inverting and Non-inverting Amplifiers, summer, differentiator and integrator- Voltage - Current and Current -Voltage converters- Log and Antilog Amplifiers.

UNIT III	COMPARATOR, WAVE GENERATOR AND CONVERTER	9

Comparators, multivibrators, waveform generators, clippers, clampers, rectifiers, peak detector, Sample and Hold (S&H) circuit, Digital to Analog (D/A) converter, Analog to Digital (A/D) converters using Op-Amps-Applications in electronic design and testing.

UNIT IV	SPECIAL ICs	9

Functional block, characteristics of 555 Timer and its Pulse width Modulation (PWM) application - IC566 Voltage Controlled Oscillator (VCO), Analog multiplier IC and its Applications, IC565 PLL - Block Schematic- applications of PLL.

UNIT V	IC REGULATORS	9

IC voltage regulators -LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, 123 Variable voltage regulators, switching regulator- Switched Mode Power Supply (SMPS)-Applications in Computer communication systems.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Describe the fabrication process and components of integrated circuits.
CO2: Apply operational amplifiers for linear and nonlinear applications.
CO3: Design waveform generators, comparators, and data converters using Op-Amps.
CO4: Analyze and utilize special ICs for signal generation and control.
CO5: Design IC-based voltage regulators and evaluate their performance.

TEXT BOOKS:

1. D. Roy Choudhary, Sheil B. Jani, "Linear Integrated Circuits", 5th Edition, New Age, 2018.
2. S. Salivahanan, "Linear Integrated Circuits", 2nd Edition, Tata Mc Graw Hill, 2015.
3. Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", 4th Edition, Pearson education, 2015.
4. Robert F. Coughlin, Fredrick F. Driscoll, "Op-amp and Linear ICs", 6th Edition, Pearson Education, 2012.

REFERENCES:

1. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits, 4th Edition, McGraw Hill, 2016.
2. David A. Bell, "Operational Amplifiers & Linear ICs", 3rd Edition, Oxford Higher Education, 2011.
3. G B Clayton, Steve winder, "Operational Amplifiers", 5th Edition, Newnes, 2003.
4. William D. Stanley, "Operational Amplifiers with Linear Integrated Circuits", 4th Edition, Pearson education, 2004.

CO-PO-PSO Mapping

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

VD25204	PRINCIPLES OF SIGNALS AND SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To classify different types of signals and systems.
- To analyze continuous-time signals in the time and frequency domains.
- To characterize continuous-time Linear Time-Invariant (LTI) systems.
- To apply discrete-time sampling and frequency-domain techniques.
- To analyze and compute the responses of discrete-time LTI systems.

UNIT I	CLASSIFICATION OF SIGNALS AND SYSTEMS	9

Continuous time signals (CT signals)- Discrete time signals (DT signals) – Step, Ramp, Pulse, Impulse, Exponential - classification of CT and DT signals – periodic and aperiodic signals, random signals, Energy & Power signals - CT and DT systems, Classification of systems.

UNIT II	SPECTRAL ANALYSIS OF CONTINUOUS TIME SIGNALS	9

Fourier series, Fourier transforms: properties – Laplace transform: properties - Spectral analysis of continuous time signals.

UNIT III	CHARACTERIZATION OF CONTINUOUS TIME LTI SYSTEMS	9

Differential Equation- -impulse response, convolution integrals- Fourier Transform and Laplace Transform in analysis of continuous time LTI system.

UNIT IV	SPECTRAL ANALYSIS OF DISCRETE TIME SIGNALS	9

Baseband Sampling of CT signals– Aliasing, Introduction to discrete Fourier series, DTFT: properties - Z-transform: properties - spectral analysis of discrete time signals.

UNIT V	CHARACTERIZATION OF DISCRETE TIME LTI SYSTEMS	9

Difference Equations-Impulse response -Convolution Sum- Discrete Fourier Transform and Z Transform in analysis of discrete time LTI systems.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Classify continuous and discrete-time signals and systems.

CO2: Analyze spectral representation of continuous-time signals using Fourier series, Fourier transform and Laplace transform.

CO3: Analyze the behavior, stability, and causality of continuous-time LTI systems.

CO4: Examine the effects of sampling and frequency-domain representations of discrete time signals.

CO5: Compute and analyze the response of discrete-time LTI systems using convolution and Z-transform methods.

TEXT BOOKS:

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, Indian Reprint, 2007.
2. B. P. Lathi, "Principles of Linear Systems and Signals", Oxford, 2nd Edition, 2009.

REFERENCES:

1. H P Hsu, "Signals and Systems", Schaum's Outlines, Tata McGrawHill, 2006.
2. S. Haykin and B. Van Veen, "Signals and Systems", 2nd Edition, Wiley,2003
3. P.Ramakrishna Rao, "Signals and Systems", Tata Mc Graw Hill Publications, 2nd Edition, 2008.
4. Dward W. Kamen, Bonnie S. Heck, "Fundamentals of Signals and Systems, Using the Web and MATLAB", Pearson, Indian Reprint, 3rd Edition,2007
5. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.

CO-PO-PSO Mapping

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

VD25205	ANALOG CIRCUITS AND SIMULATION LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

- To construct and test amplifier circuits and study their frequency response.
- To analyze the limitation in bandwidth of single stage and multi stage amplifier
- To develop differential amplifiers and measure CMRR.
- To analyze BJT and JFET amplifiers using simulation tools.
- To verify analog circuit performance through PSPICE simulation.

LIST OF EXPERIMENTS:

1. Frequency Response of CE, CB, CC and CS amplifiers
2. Darlington Amplifier Transfer characteristics
3. Differential Amplifiers -CMRR Measurement
4. Cascode and Cascade amplifiers
5. Determination of bandwidth of single stage and multistage amplifiers
6. Analysis of BJT with Fixed bias and Voltage divider bias using Spice
7. Analysis of FET, MOSFET with fixed bias, self-bias and voltage divider bias using simulation software like Spice
8. Analysis of Cascode amplifiers using Spice
9. Analysis of Cascade amplifiers using Spice
10. Analysis of Frequency Response of BJT and FET using Spice

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Construct amplifier configurations and their frequency responses
CO2: Design and Test BJT/JFET amplifiers.
CO3: Design and verify differential amplifiers with CMRR measurement.
CO4: Analyze frequency responses of amplifier configurations using simulation tools.
CO5: Use PSPICE simulation software to analyze analog circuit performance.

CO-PO-PSO Mapping

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

VD25206	DIGITAL SYSTEM DESIGN LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

- To familiarize students with the basics of Boolean algebra, different flip-flops and various code converters using logic gates.
- To design and construct essential combinational circuits like encoders, decoders, multiplexers, and demultiplexers.
- To designing asynchronous and synchronous counters.
- To implement different types of shift registers.
- To develop skillsets to simulate, implement, and verify digital circuits using HDL tools.

LIST OF EXPERIMENTS:

1. Implementation of the Given Boolean Function using Logic Gates in Both SOP and POS forms.
2. Design and implementation of code converters using logic gates.
   (i) BCD to excess-3 code and vice versa.
   (ii) Binary to gray and vice-versa.
3. Design and implementation of 4-bit binary Adder/ Subtractor and BCD adder using IC 7483.
4. Design and implementation of Encoder and Decoder using logic gates.
5. Design and implementation of Multiplexer and De-multiplexer using logic gates.
6. Verification of State Tables of RS, JK, T and D Flip-Flops using logic Gates.
7. Construction and verification of 4-bit ripple counter and Mod-10 / Mod-12 Ripple counters.
8. Design and implementation of 3-bit synchronous up/down counter.
9. Design and implementation of Shift Registers (SISO, SIPO, PIPO, PISO).
10. Design and implementation of combinational circuits using HDL.
11. Design and implementation of Coding sequential circuits using HDL.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Design the basics of Boolean algebra, different flip-flops and various code converters using logic gates.

CO2: Design and construct essential combinational circuits like encoders, decoders, multiplexers, and demultiplexers.

CO3: Design and verify asynchronous and synchronous counters.

CO4: Implement different types of shift registers.

CO5: Design, code, and verify sequential circuits using HDL tools.

CO-PO-PSO Mapping

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

CS25C14	PROBLEM SOLVING USING PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To describe the problem solving approaches.
- To solve the basic programming constructs in Python.
- To illustrate various computing strategies for Python-based solutions to real world problems.
- To make use of Python data structures - lists, tuples, and dictionaries.
- To explain input/output with files in Python.

LIST OF EXPERIMENTS

1. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
2. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern).
3. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building – operations of list & tuples)
4. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
5. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
6. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
7. Implementing programs using written modules and Python Standard Libraries (pandas,numpy. Matplotlib, scipy)
8. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
9. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter‟s age validity, student mark range validation).
10. Implementation of Python Basic Libraries such as Statistics, Math, Numpy and Scipy.
11. Implementation of Python Libraries for ML application such as Pandas and Matplotlib.

TOTAL:60 PERIODS

COURSE OUTCOMES:

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

CO1: Develop algorithmic solutions to simple computational Problems.
CO2: Illustrate and execute basic Python programs using simple statements.
CO3: Build program for scientific problems using strings, functions and control statements.
CO4: Utilize compound data types lists, tuples and dictionaries for real-time applications.
CO5: Experiment the python packages, files and exceptions for developing software applications.

CO-PO-PSO Mapping

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

MA25405	GRAPH THEORY AND ITS APPLICATIONS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To explain the fundamental concepts of graph theory.
- To demonstrate with the concept of trees and planar graphs.
- To compute graph coloring, matching and covering number.
- To apply the concept of directed graphs and its properties in networks.
- To describe applications of graph theory in various fields.

UNIT I	GRAPHS	12

Basic definitions in graphs - Adjacency matrix - Incidence matrix- walk, path, circuits- isomorphism, Connected and disconnected graph- Operations on graphs- Eulerian graph – Hamiltonian graph.

UNIT II	TREES AND PLANAR GRAPHS	12

Properties of trees – distance and centers in tree –Algorithms (Kruskal's and Dijkstra Algorithm) - Rooted and binary trees, Spanning trees – Planar graphs: Definition and Properties.

UNIT III	COLORING AND COVERING	12

Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Vertex covering – Edge covering

UNIT IV	DIRECTED GRAPHS	12

Directed graphs – Types of directed graphs – digraphs & its properties and binary relations – directed paths and connectedness – Euler graphs.

UNIT V	APPLICATIONS OF GRAPH THEORY	12

Graphs in switching and coding theory, Electrical network analysis by graph theory, Graph theory in Markov Processes: Multi step Transition Probabilities, Transient analysis of a Markov Process.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Predict various types of graphs and determine the existence of Eulerian, Hamiltonian path &circuits.

CO2: Explain the planarity of graphs and the classes of trees with its properties.

CO3: Analyze the properties of Coloring, Matching and Covering in the graph.

CO4: Classify the types of directed graphs and its properties.

CO5: Apply suitable graph theory techniques for solving Engineering problems

TEXT BOOKS:

1. J.A.Bondy and USR.Moorthy, "Graph Theory with Applications", 2nd edition, Indian Reprint, Springer Publishers, 2015
2. Robert Sedgewick, "Graph Algorithms", 2nd edition, Cambridge University Press, 2021

REFERENCES:

1. R. Diestel, Graph theory, 5th edition, Springer publication, 2024.
2. Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science", Dover Publications, IAC, 2016
3. Frank Harary, "Graph Theory", Narosa Publishers, New Delhi, 2013

CO-PO-PSO Mapping

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

VD25207	DISCRETE TIME SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To apply discrete Fourier transform (DFT) and fast Fourier transform (FFT) for linear filtering of signals.
- To design digital IIR filters using various design techniques.
- To design FIR filters using standard design approaches.
- To analyze the effects of finite precision representation on digital filters.
- To apply the principles of multirate signal processing in various applications.

UNIT I	DISCRETE FOURIER TRANSFORM	9

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

UNIT II	INFINITE IMPULSE RESPONSE FILTERS	9

Characteristics of practical frequency selective filters - Characteristics of commonly used analog filters - Butterworth filters, Chebyshev filters. Design of IIR filters from analog filters (LPF, HPF, BPF, BRF) - Impulse invariance method, Bilinear transformation. Frequency transformation in the analog domain. Structure of IIR filter - direct form I, direct form II, Cascade, parallel realizations.

UNIT III	FINITE IMPULSE RESPONSE FILTERS	9

Design of FIR filters - symmetric and Anti-symmetric 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 - ADC - quantization - truncation and rounding - quantization noise - 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	MULTIRATE SIGNAL PROCESSING	9

Sampling rate conversion, Decimation by an integer factor, Interpolation by an integer factor, Sampling rate conversion by a rational factor, Poly-phase FIR structures, Multistage design of decimator and interpolator.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Apply FFT and DFT algorithms for signal filtering.
CO2: Design IIR filters using suitable transformation techniques.
CO3: Design FIR filters using various windowing and frequency sampling methods.
CO4: Analyze the impact of finite word length on digital signal processing performance.
CO5: Apply multirate signal processing concepts to real-world applications.

TEXT BOOKS:

1. John G. Proakis and Dimitris G.Manolakis, Digital Signal Processing – Principles, Algorithms and Applications, 5th Edition, Pearson Education / Prentice Hall, 2022.
2. A. V. Oppenheim, R.W. Schafer and J.R. Buck, "Discrete-Time Signal Processing", 4th Edition, Pearson, 2011.

REFERENCES:

1. Emmanuel C. Ifeachor & Barrie. W. Jervis, "Digital Signal Processing", 2nd Edition, Pearson Education / Prentice Hall, 2002.
2. Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", 4th Edition, Tata Mc Graw Hill, 2013.
3. Andreas Antoniou, "Digital Signal Processing", Tata Mc Graw Hill, 2006.

E- RESOURCES:

1. https://nptel.ac.in/courses/117105134
2. https://nptel.ac.in/courses/108106151
3. https://nptel.ac.in/courses/108105055

CO-PO-PSO Mapping

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

VD25208	MICROPROCESSOR, MICROCONTROLLER AND INTERFACING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To understand the Architecture of 8086 microprocessor.
- To learn the design aspects of I/O and Memory Interfacing circuits.
- To study the Architecture of 8051 microcontroller.
- To interface microprocessors with supporting chips.
- To design a microcontroller based system

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 – Byte and String Manipulation

UNIT II	8086 SYSTEM BUS STRUCTURE	9

8086 signals – Basic configurations – Minimum and Maximum mode configurations – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Interrupts and interrupt service routines

UNIT III	8051 MICROCONTROLLER	9

Architecture and pin configuration – Functional blocks – Memory organization – I/O ports and data transfer concepts — Interrupts – Special Function Registers (SFRs) –- Instruction set – Addressing modes – Assembly language programming

UNIT IV	I/O INTERFACING	9

Memory interfacing and I/O interfacing – Parallel communication interface – Serial communication interface – D/A and A/D interfacing – Timer – Keyboard/display controller – Interrupt controller – DMA controller – Programming and applications : Traffic light controller, keyboard–display interface

UNIT V	INTERFACING MICROCONTROLLER	9

8051 timer programming – Serial port programming – Interrupt programming – LCD and keyboard interfacing –sensor interfacing – External memory interfacing – Stepper motor interfacing and waveform generation – Comparison of microprocessor, microcontroller -- PIC Microcontroller

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand and execute programs based on 8086 Microprocessor.
CO2: Analyze system bus architecture and multiprocessor configurations of 8086.
CO3: Understand and execute programs based on 8051 Microcontroller
CO4: Outline the Interfacing of 8086 with peripherals
CO5: Implement microcontroller-based embedded systems

TEXT BOOKS:

1. Yu-Cheng Liu and Glenn A. Gibson, Microcomputer Systems: The 8086/8088 Family – Architecture, Programming and Design, 2nd Edition, Prentice Hall of India, 2007.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay, The 8051 Microcontroller and Embedded Systems, 2nd Edition, Pearson Education, 2011.

REFERENCES:

1. Douglas V. Hall, Microprocessors and Interfacing: Programming and Hardware, Tata McGraw-Hill, 2012.
2. A. K. Ray and K. M. Bhurchandi, Advanced Microprocessors and Peripherals, 3rd Edition, Tata McGraw-Hill, 2012.

E-RESOURCES:

1. https://nptel.ac.in/courses/108103157
2. https://nptel.ac.in/courses/108105102
3. https://nptel.ac.in/courses/117104072

CO-PO-PSO Mapping

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

VD25209	COMPUTER ARCHITECTURE AND ORGANIZATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES :

- To explain the fundamental concepts of computer architecture and organization.
- To analyze data path structures and arithmetic algorithms used in CPUs.
- To explain control unit design and pipelining concepts.
- To describe the organization of cache and virtual memory systems.
- To understand advanced parallel processing architectures and multicore processor organizations.

UNIT I	COMPUTING AND COMPUTERS	9

Evolution of Computers, VLSI Era, buses, bus control, bus interfacing, bus arbitration, System Design methodology: Gate level, Register Level, Processor Level, CPU Organization, Characteristics of CISC and RISC processors architecture, Instruction formats, instruction set, programming

UNIT II	DATA PATH DESIGN	9

Data Representation, Fixed Point Numbers, Floating Point Numbers, Fixed Point Arithmetic, Addition, Subtraction, Multiplication and Division, Combinational and Sequential ALUs, Carry look ahead adder, Robertson algorithm, Booth‘s algorithm, Modified booth‘s Algorithm, Restoring and non- restoring division algorithm, Floating Point Arithmetic,

UNIT III	CONTROL DESIGN AND PIPELINING DESIGN	9

Hardwired Control, Microprogrammed Control, Multiplier Control Unit, CPU Control Unit, Pipeline Techniques- Linear pipeline processors, non- linear pipeline processors, Instruction pipeline design, Pipeline Performance, Arithmetic pipeline design.

UNIT IV	MEMORY ORGANIZATION	9

Memory hierarchy technology, Memory types- RAM, ROM, MOS- static and dynamic RAM cell, Virtual Memory: Address translation-TLB-page operation-Demand paging, Multicore architecture, Cache memory system-Mapping function, Cache write/updating, Cache coherence, Performance characteristics of two level memories.

UNIT V	ADVANCED PROCESSORS	9

Parallel Processing: Multiple Processors Organization, Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Multithreading and Chip Multiprocessors, Clusters, uniform Memory Access - Multicore Computers: Multicore Organization, Heterogeneous Multicore Organization, Intel Core i7-5960X, ARM Cortex-A15 MPCore, IBM z13 Mainframe, Superscalar processors, vector processors

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Explain the architecture and organization of modern computer systems.
CO2: Analyze data path designs for arithmetic and logic operations.
CO3: Illustrate control unit design and pipelining mechanisms in processors.
CO4: Examine cache and virtual memory systems and their mapping techniques.
CO5: Compare multicore and parallel processor architectures including superscalar and vector processors.

TEXT BOOKS:

1. John P.Hayes, "Computer architecture and Organisation", Tata McGraw-Hill, 3rd Edition, 1998.
2. William Stallings, "Computer Organization & Architecture", 11th Edition, Pearsons, 2022.
3. Kai Hwang, Naresh Jotwani, "Advanced computer Architecture: Parallelism, Scalability, Programmability", Tata McGraw Hill, 3rd Edition, 2017.

REFERENCES:

1. V.Carl Hamacher, Zvonko G. Varanesic, Safat G. Zaky, "Computer Organisation", 5th Edition, McGraw-Hill Inc, 2001.
2. Morris Mano, "Computer System Architecture", Prentice-Hall of India, 2000.
3. Behrooz Paraami, "Computer Architecture, From Microprocessor to Supercomputers", Oxford University Press, Sixth impression 2010.
4. P.Pal Chaudhuri, "Computer organization and design", 2nd Edition, Prentice Hall, 2007.
5. Miles J. Murdocca and Vincent P. Heuring, "Principles of Computer Architecture", Prentice Hall, 2000

E-RESOURCES:

1. https://nptel.ac.in/courses/106102062
2. https://nptel.ac.in/courses/106105163
3. https://nptel.ac.in/courses/106106166

CO-PO-PSO Mapping

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

VD25210	CONTROL SYSTEMS ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To model and represent control systems using transfer functions and signal flow graphs.
- To determine time-domain responses and steady-state characteristics of control systems.
- To analyze the frequency response of open- and closed-loop systems.
- To evaluate system stability using classical and modern techniques.
- To formulate and analyze control systems using state-space models.

UNIT I	COMPONENTS OF THE CONTROL SYSTEM	9

Terminology and Basic Structure-Feed forward and Feedback control theory - Electrical and Mechanical Transfer Function Models-Block Diagram Models-Signal flow graphs models-DC and AC servo Systems-Synchronous -Multivariable control system

UNIT II	TIME RESPONSE WITH SYSTEM DESIGN	9

Transient response-steady state response-Measures of performance of the standard first order and second order system-effect on an additional zero and an additional pole-steady error constant and system- type number-PID control-Analytical design for PD, PI, PID control systems

UNIT III	FREQUENCY RESPONSE WITH SYSTEM ANALYSIS	9

Closed loop frequency Response-Performance specification in frequency domain - Frequency response of standard second order system- Bode Plot - Polar Plot- Nyquist plots-Design of compensators using Bode plots-Cascade lead compensation Cascade lag compensation-Cascade lag-lead compensation

UNIT IV	STABILITY ANALYSIS	9

Concept of stability-Bounded Input Bounded Output stability - Routh stability criterion - Relative stability-Root locus concept-Guidelines for sketching root locus - Nyquist stability criterion.

UNIT V	CONTROL SYSTEM ANALYSIS	9

State variable representation-Conversion of state variable models to transfer functions-Conversion of transfer functions to state variable models-Solution of state equations-Concepts of Controllability and Observability-Stability of linear systems Equivalence between transfer function and state variable representations-State variable analysis of digital control system-Digital control design using state feedback.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Model control systems using transfer functions, block diagrams, and signal flow graphs.
CO2: Compute time-domain performance and steady-state errors of control systems.
CO3: Analyze frequency response and design compensators using standard plots.
CO4: Evaluate system stability using Routh, Nyquist, and Root Locus methods.
CO5: Develop state-space models and analyze controllability and observability of systems.

TEXT BOOKS:

1. M.Gopal,"Control System – Principles and Design", 5th Edition, Tata McGraw Hill, 2016
2. K.Ogata, "Modern Control Engineering", 5th Edition, PHI, 2017.

REFERENCES:

1. J.Nagrath and M.Gopal, "Control System Engineering", 7th Edition, New Age International Publishers, 2021.
2. S.K.Bhattacharya, "Control System Engineering", 3rd Edition, Pearson, 2013.
3. Benjamin.C.Kuo, "Automatic Control Systems", 10th Edition, Prentice Hall of India, 2017.
4. Norman S Nise, "Control Systems Engineering", 6th Edition (Reprint), Wiley, 2017

E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc25_de14/preview
2. https://onlinecourses.nptel.ac.in/noc25_ee104/preview

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
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
Course Contribution	3	3	3	2	-	-	-	-	1	-	1	1	1

VD25211	ELECTROMAGNETIC WAVES AND ELECTROMAGNETIC COMPATIBILITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the vector calculus and the fundamental laws governing electrostatic and magneto static fields.
- To analyze time-varying electromagnetic fields and wave propagation using Maxwell's equations.
- To introduce the mechanisms, sources, and effects of electromagnetic interference in electronic systems.
- To equip with practical methods to control and mitigate EMI through grounding, shielding, filtering, and interconnection techniques.
- To familiarize EMC measurement techniques, international standards, and PCB design practices for achieving compliance.

UNIT I	BASIC CONCEPTS AND ELECTROMAGNETIC FIELDS FUNDAMENTALS	9

Vector Analysis and Coordinate Systems: Review of vector fields, gradient, divergence, and curl. Electrostatics: Coulomb's Law, electric field intensity, Gauss's Law, electric potential, Poisson's and Laplace's equations, and boundary conditions. Magnetostatics: Biot-Savart's Law, Ampere's circuital law, magnetic flux density, magnetic potential, and magnetic properties of materials.

UNIT II	TIME-VARYING FIELDS AND WAVE PROPAGATION	9

Maxwell's Equations: Derivation of Maxwell's equations in point and integral forms for various media, including the concept of displacement current. Uniform Plane Waves: Wave equations in free space, perfect dielectrics, and conducting media. Wave Characteristics: Parameters like intrinsic impedance, attenuation and phase constants, skin depth, polarization, and the Poynting theorem.

UNIT III	EMI/EMC CONCEPTS AND COUPLING PRINCIPLES	9

Introduction to EMI/EMC: Definitions of EMI and EMC, sources of EMI - switches, relays, ESD - classification of emissions and susceptibility - Conducted Emission - Radiated Emission. Coupling Mechanisms: Analysis of how EMI travels between source and victim, including capacitive coupling, inductive coupling, common impedance coupling, ground loop coupling, and radiation coupling.

UNIT IV	EMI CONTROL TECHNIQUES	9

Grounding and Shielding: Principles of grounding, grounding methods (single-point, multi-point), and theory of electromagnetic shielding and its effectiveness. Filtering and Suppression: Design and application of power line filters, common-mode and differential- mode filters, and transient suppression techniques. Cabling and Interconnection: EMC considerations for cables, shielding of cables, and proper connector usage.

UNIT V	EMC MEASUREMENTS AND STANDARDS	9

EMI Measurements: Description of test sites and equipment, including open area test sites, anechoic chambers, TEM cells, and measurement precautions. Standards and Regulations: Overview of national and international EMC standards - FCC, CISPR, ISO, military standards. Printed Circuit Board (PCB) Design for EMC: Layout and routing considerations for PCBs to minimize crosstalk and emissions.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Apply vector analysis to evaluate electric and magnetic field quantities.

CO2: Analyze time-varying fields and predict wave behavior in various media using Maxwell's equations, wave equations, and power flow concepts.

CO3: Classify EMI sources and evaluate coupling paths between aggressor and victim circuits.

CO4: Design and justify grounding strategies, shielding configurations, filters, and suppression techniques to minimize EMI in practical systems.

CO5: Apply PCB layout practices and EMC standards to ensure electromagnetic compatibility.

TEXT BOOKS

1. V Prasad Kodali, "Engineering Electromagnetic Compatibility", 2nd Edition, IEEE Press, New York, 2001.
2. Bhag Singh Guru (Author), Hüseyin R. Hiziroglu, "Electromagnetic Field Theory Fundamentals", 2nd Edition, Cambridge University Press; 2009.
3. Ott, Henry W., "Electromagnetic Compatibility Engineering", 1st Edition, CRC Press, 2009

REFERENCES:

1. David J. Griffiths., "Introduction to Electrodynamics", 5th Edition, Cambridge University, 2023.
2. W Scott Bennett, "Control and Measurement of Unintentional Electromagnetic Radiation", 1st Edition, John Wiley & Sons Inc., (Wiley Inderscience Series), 1997.
3. Dr Kenneth L Kaiser, "The Electromagnetic Compatibility Handbook", 1st Edition, CRC Press, 2005.

E – RESOURCES:

1. https:// nptel.ac.in/courses/108105375
2. https://nptel.ac.in/courses/108106138

CO-PO-PSO Mapping

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

EN25C06	PROFESSIONAL SKILLS ENHANCEMENT LABORATORY *(Common to all B.E./B.Tech. branches)*	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

The course enables the students,

- To explain about interpersonal and professional communication skills that apply to real-world situations.
- To describe the use of digital communication tools for effective collaboration and presentation.
- To discuss the importance of self-awareness, motivation, and goal setting for career development.
- To outline strategies for managing time, stress, and emotional intelligence in professional settings.
- To summarize teamwork, leadership, and employability skills that are developed through group activities and interviews.

UNIT I	PROFESSIONAL COMMUNICATION ETIQUETTES	6

Communication - Types of Communication - Presentation skills using digital tools(Canva, google slides, power point)- Personal Appearance, Posture, Gestures, Facial Expressions, Eye Contact and Space Distancing - Professional Etiquette, Virtual Etiquette (Online Meetings, E-Professionalism, and Netiquette)

UNIT II	GOAL SETTING AND MOTIVATION FOR PROFESSIONAL GROWTH	6

Short term and Long term Goals- Strategies to set and achieve goals- Motivation - Self Awareness and SWOC Analysis

UNIT III	TIME AND STRESS MANAGEMENT FOR CAREER SUCCESS	6

Importance of Time - Time Management Skills - Stress Management - Analysis of the Case Studies on time and stress management - Work life balance and Emotional Resilience

UNIT IV	GROUP DISCUSSIONS FOR DECISION MAKING & PROBLEM SOLVING	6

Group Discussions - Leadership & Decision Making Techniques -Personality traits Collaborative Team work - Problem Solving - Negotiation Skills & Professional Persuasion - Positive role in GD-Mock GD.

UNIT V	PRE-PLACEMENT SKILLS ENHANCEMENT	6

Preparing Resume - E - Resume using digital Tools - Cover Letter – Job Application through email - Social Media Posts(LinkedIn) - FAQs in Interviews - Mock Interviews - Verbal and Reasoning (Verbal Ability, Logical Reasoning, Verbal Reasoning)

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Recognize effective communication strategies used in face-to-face and digital environments.
CO2: Identify the role of self-awareness and motivation in supporting career growth.
CO3: Discuss basic time and stress management practices that enhance productivity.
CO4: Outline the key elements of effective participation in group discussions and teamwork.
CO5: Summarize the components of professional résumés, digital profiles, and interview preparation.

TEXTBOOK:

1. Shalini Verma, "Business Communication: Essential Strategies for 21st Century Professionals", Pearson India, 2022.

REFERENCES:

1. Arati Anupkumar Agarwal, "Communication Skills in English for Engineers and Technologists", CBS Publishers & Distributors Pvt. Ltd., 2025.
2. Daniel Goleman, "Emotional Intelligence: Why It Can Matter More Than IQ", Bantam Books, 2021.
3. Dale Carnegie, "How to Win Friends and Influence People in the Digital Age", Simon & Schuster, 2020.
4. Mohan Krishna & Meera Banerji, "Developing Communication Skills", 1st Edition, Trinity Press, 2017.

CO-PO-PSO Mapping

CO		PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
		K-Level	K3	K4	K5	K5	K6	K3	K2	K3	K3	K2	K3
CO1	Demonstrate effective communication skills through presentations	K2	-	-	-	-	1	1	-	1	2	3	-
CO2	Apply knowledge of motivation in setting and achieving goals	K3	-	-	-	-	-	1	-	1	2	3	-
CO3	Examine time and stress management	K3	-	-	-	-	-	-	-	1	2	3	1
CO4	Explore ideas into effective communication in formal contexts	K3	-	-	-	-	1	1	-	1	2	3	1
CO5	Develop resume for personal interviews confidently	K3	-	-	-	-	1	-	-	1	2	3	-
Course Contribution													

VD25212	MICROPROCESSOR, MICROCONTROLLERS AND INTERFACING LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

- To provide hands-on training in programming microprocessors and microcontrollers.
- To develop skills in assembly language programming.
- To understand interfacing of peripheral devices.
- To simulate and execute programs using standard development tools.
- To implement simple real-time applications using microcontrollers.

LIST OF EXPERIMENTS

8086 MICROPROCESSOR EXPERIMENTS (Using Kits / Simulator)

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Code conversion
4. sorting and searching
5. string manipulations
6. Counters

INTERFACING EXPERIMENTS USING 8086 (Using Kits)

1. Traffic light controller
2. Stepper motor control
3. Key board and Display

8051 MICROCONTROLLER EXPERIMENTS (Using Kits / Simulator)

1. Basic arithmetic and logical operations.
2. Square and cube of a number, finding 2's complement.
3. Subroutine using CALL and RET
4. Interfacing – LED
5. Interfacing – D/A interface and Waveform Generation

1.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Execute assembly language programs for microprocessors and microcontrollers.

CO2: Apply programming logic for data manipulation and code conversion.

CO3: Interface ADC and DAC with processors.

CO4: Implement serial communication and motor interfacing.

CO5: Use simulators and development tools for embedded applications

CO-PO-PSO Mapping

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