DHANALAKSHMI SRINIVASAN
COLLEGE OF ENGINEERING
(AUTONOMOUS)
COIMBATORE - 641 105 | www.dsce.ac.in

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS-2024

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING

CHOICE BASED CREDIT SYSTEM (CBCS)

NH -47, Palakkad Main Road, Post, Navakkarai,
Coimbatore-641 105
Tamil Nadu, India

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REGULATIONS – 2024

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CHOICE BASED CREDIT SYSTEM (CBCS)

SEMESTER I

S. No.	Course Code	Course Title	Category	L	T	P	Contact Hours	C
THEORY								
1	HS24001	Communicative English – I	HSM	3	0	0	3	3
2	MA24001	Engineering Mathematics – I	BS	3	1	0	4	4
3	PH24001	Engineering Physics	BS	3	0	0	3	3
4	CY24001	Engineering Chemistry	BS	3	0	0	3	3
5	ES24001	Engineering Graphics	ES	2	0	4	6	4
6	TA24001	Heritage of Tamils	HSM	1	0	0	1	1
7	MN24001	Overview of Engineering and Technology	MN	3	0	0	3	0
PRACTICALS								
8	BS24001	Engineering Physics & Chemistry Laboratory	BS	0	0	4	4	2
9	ES24002	Engineering Practices Laboratory	ES	0	0	4	4	2
10	HS24002	Communicative Laboratory	HSM	0	0	2	2	1
TOTAL				**18**	**1**	**14**	**33**	**23**

SEMESTER II

S. No	Course Code	Course Title	Category	L	T	P	Contact Hours	C
THEORY								
1.	HS24003	Communicative English II	HSM	3	0	0	3	3
2.	MA24002	Statistics and Numerical Methods	BS	3	1	0	4	4
3.	PH24002	Physics for Electronics Engineering	BS	3	0	0	3	3
4.	EC24001	Electron Devices and Circuit	ES	3	0	0	3	3

		Theory						
5.	CS24001	Problem Solving and Python Programming	ES	3	1	0	4	4
6.	TA24002	Tamils and Technology	HSM	1	0	0	1	1
7.	MN24002	Environmental Science and Sustainability	MN	3	0	0	3	0
PRACTICALS								
8.	EC24002	Electron Devices and Circuit Theory Laboratory	ES	0	0	4	4	2
9.	CS24002	Problem Solving and Python Programming Laboratory	ES	0	0	4	4	2
TOTAL				**19**	**2**	**8**	**29**	**22**

SEMESTER-III

S. No	Course Code	Course Title	Category	L	T	P	Contact Hours	C
THEORY								
1.	MA24302	Transforms and Partial Differential Equations	BS	3	1	0	5	4
2.	EC24301	Analog Electronics	PC	3	0	0	3	3
3.	EC24302	Communication Systems	PC	3	0	0	3	3
4.	EC24303	Signals and Systems	PC	4	0	0	4	4
5.	EC24304	Digital System Design	PC	3	0	2	5	4
6.	EC24305	Energy Storage Techniques	PC	3	0	0	3	3
PRACTICALS								
7.	EC24311	Analog Electronics Laboratory	PC	0	0	3	3	1.5
8.	EC24312	Communication Systems Laboratory	PC	0	0	3	3	1.5
9.	EC24313	Energy Storage Techniques Laboratory	PC	0	0	2	3	1
TOTAL				**19**	**1**	**10**	**32**	**25**

SEMESTER – IV

S. No	Course Code	Course Title	Category	L	T	P	Contact Hours	C
THEORY								
1.	EC24401	Electromagnetic Fields	PC	3	1	0	5	4
2.	EC24402	Linear integrated circuits	PC	3	0	0	3	3
3.	EC24403	Digital Signal Processing	PC	3	0	2	5	4
4.	EC24404	Control Systems	PC	3	0	0	3	3

5.	EC24405	Data Structure and Algorithms	PC	3	0	2	5	4
6.	EC24406	Microprocessor And Microcontrollers	PC	3	0	0	3	3
PRACTICALS								
7.	EC24411	Soft Skill-Verbal & Reasoning	EEC	3	0	0	2	0
8.	EC24412	Linear Integrated Circuits Laboratory	PC	0	0	3	3	2
TOTAL				**21**	**1**	**7**	**29**	**23**

HS24001-COMMUNICATIVE ENGLISH-I								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	3	0	0	45	3	40	60	100

Course Objectives

- To enable learners to understand the basics of communication.
- To empower learners to use narrative techniques to convey ideas and experiences in academic and work environment.
- To support learners in enhancing their linguistic competence and engaging in effortless dialogue.
- To assist learners in mastering language for the successful academic and professional communication.
- To strengthen language proficiency for effective comprehension of core curricula.

UNIT I - Basics of Communication **Listening -** Telephone conversation, Listening to Podcast, NEWS, Interviews **Speaking -** Verbal and Non-Verbal Conversation, Role play **Reading** - Types of Reading- Skimming, Scanning, Intensive and Extensive finding key information in a given text **Writing -** Passage Comprehension , Formal Letter Writing Professional Email Writing **Grammar** - Parts of Speech - Noun, Verb, Pronoun & Adverb, Tense -Present Tense, Types of Sentences **Vocabulary -** Prefix & Suffix	**9**
UNIT II - Narrative Skill Development **Listening -** Watching travel documentary **Speaking -** Narrating a story , Narrating a personal incident **Reading -** Reading Travelogues, Blogs **Writing** Paragraph Writing, Rearrangement of jumbled sentences **Grammar -** Tense Past Tense, Subject Verb Agreement, Auxiliary and Modal Verbs **Vocabulary -** Synonyms and Antonyms	**9**
UNIT III Enriching Speaking Skills **Listening -** Dialogues & conversations **Speaking -** Group Conversation, Speaking on given topics and context **Reading -** Reading Newspaper Articles, Reading user manuals **Writing -** Instructions, Writing definitions **Grammar** - Adjective, Tense Future Tense, Types of Questions WH Questions **Vocabulary -** Abbreviations & Acronyms	**9**
UNIT IV - Language Enhancement **Listening -** Listening to TED Talks **Speaking -** Speaking about friends/places/hobbies, Delivering Welcome Address **Reading -** Reading Biography, Reading Editorial **Writing -** Short Report writing	**9**

Grammar Preposition, Question Tags, Yes or No questions, Articles **Vocabulary** One word Substitution	
UNIT V - Technical Usage of Language **Listening -** Listening to native dialects & live commentaries **Speaking -** Group Discussion, Debates, Proposing Vote of Thanks **Reading -** Opinion articles, Journal Reports **Writing -** Essay Writing **Grammar -** Cause and Effect expressions**,** Negations **Vocabulary -** Gerund & infinitives, Compound Noun	**9**
Total Hours	**45**

Textbook(s)	
1	English for Engineers & Technologists Orient Blackswan Private Ltd., Anna University, 2020.
2	Veena Selvam, Sujatha Priyadarshini, Deepa Mary Francis, K. N. Shoba, Lourdes Joevani, English for Science & Technology, Cambridge University Press, 2021.
Reference(s)	
1	English for Academic Correspondence and Socializing by Adrian Wall work, Springer, 2011.
2	Ashraf Rizvi, "Effective Technical Communication", 2nd Edition, McGraw-Hill India, 2017.
3	Meenakshi Raman, Technical Communication, Oxford University Press, New Delhi, 2017
4	Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai, 2011.

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

Course Outcomes		**Level**
CO1	Communicate effectively using grammatical words according to the context.	K1
CO2	Analyze the given context and frame content accordingly using narrative skills.	K2
CO3	Effectively use language techniques in extended discussions.	K2
CO4	Frame short and long sentences using grammatical techniques according to given context.	K1
CO5	Respond with clarity and accuracy in a range of professional situations, using appropriate linguistic accuracy.	K3

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**1**	**1**	**1**	**1**	**1**	**3**	**3**	**3**	**1**	**3**	**-**	**3**	**-**	**-**	**-**
CO2	**1**	**1**	**1**	**1**	**1**	**3**	**3**	**3**	**1**	**3**	**-**	**3**	**-**	**-**	**-**
CO3	**2**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
CO4	**2**	**3**	**2**	**3**	**-**	**3**	**3**	**3**	**2**	**3**	**-**	**3**	**-**	**-**	**-**
CO5	**2**	**3**	**3**	**3**	**-**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

MA24001 – ENGINEERING MATHEMATICS – I								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	3	1	0	60	4	40	60	100

Course Objectives

- Understand the concept of matrices and reduction quadratic form to canonical form.
- Solve the problems using fundamentals principles of calculus.
- Apply the concept of calculus in several variables.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals.

UNIT I - MATRICES Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.	**12**
UNIT II – DIFFERENTIAL CALCULUS Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications: Maxima and Minima of functions of one variable	**12**
UNIT III - FUNCTIONS OF SEVERAL VARIABLES Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – 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.	**12**
UNIT IV – INTEGRAL CALCULUS Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts(reduction),Trigonometric substitutions, Integration of rational functions by partial fraction,improper intergrals.	**12**
UNIT V - MULTIPLE INTEGRALS Double integrals – Change of order of integration – Double integrals in polar coordinates – Area as a double integral - Triple integrals.	**12**
Total Hours	**60**

Textbook(s)

1	Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2	Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3	James Stewart, "Calculus:Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015.

Reference(s)

1	Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016.
2	Bali. N., Goyal. M. and Watkins. C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd), New Delhi, 7th Edition, 2009.
3	Jain. R.K. and Iyengar. S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition, 2016.
4	Narayanan. S. and Manicavachagom Pillai. T. K., “Calculus” Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6	Srimantha Pal and Bhunia. S.C, "Engineering Mathematics" Oxford University Press, 2015.
7	Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus", 14th Edition, Pearson India, 2018.

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

Course Outcomes		Level
CO1	Understand the matrix algebra methods for solving practical problems.	K2
CO2	Apply differential calculus tools in solving various application problems.	K4
CO3	Use differential calculus ideas on several variable functions.	K3
CO4	Apply different methods of integration in solving problems.	K4
CO5	Apply multiple integral ideas to find the area.	K3

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**3**	**-**	**-**	**-**
CO2	**3**	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**3**	**-**	**-**	**-**
CO3	**3**	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**3**	**-**	**-**	**-**
CO4	**3**	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**3**	**-**	**-**	**-**
CO5	**3**	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**3**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

PH24001 – ENGINEERING PHYSICS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	3	0	0	45	3	40	60	100

Course Objectives

- To introduce the concepts of Laser and its applications.
- To achieve an understanding of mechanics.
- To introduce the concepts of thermal physics.
- To gain knowledge about the basics of quantum mechanics.
- To understand the applications of quantum mechanics.

UNIT I – LASER Theory of laser - characteristics - spontaneous and stimulated emission - Laser action- Einstein's A and B coefficients derivation - pumping methods - resonant cavity, optical amplification (qualitative) - population inversion - Types of laser – Nd -YAG laser, CO_2 laser - Basic applications of lasers in industries – laser heat treatment in annealing, welding, drilling, cutting and soldering – Application of laser in fibre optic communication system.	**9**
UNIT II - MECHANICS Linear motion and rotational motion – Multi particle dynamics – Center of mass (CM) – kinetic energy of system of particles– Physical significance of moment of inertia – M.I of a diatomic molecule – Torsional pendulum.	**9**
UNIT III - THERMAL PHYSICS Modes of heat transfer - thermal conduction, convection and radiation - heat conduction in solids - thermal conductivity - Lee's disc method: theory and experiment - conduction through compound media (series and parallel) - Application: Solar water heater.	**9**
UNIT IV - BASIC QUANTUM MECHANICS Photons and light waves - wave particle duality - De Broglie's wavelength - Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization - particle in an infinite potential well - particle in a 3D box - correspondence principle (qualitative).	**9**
UNIT V - APPLIED QUANTUM MECHANICS Barrier penetration and quantum tunneling (qualitative)- Scanning Tunneling microscope – Resonant diode – Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model.	**9**
Total Hours	**45**

Textbook(s)

1	M. N. Avadhanulu, P. G. Kshirsagar, T. V. S. Arun Murthy, "A Textbook of Engineering Physics", 11th Edition, S. Chand & Company Pvt. Ltd., New Delhi, 2019.
2	D. K. Bhattacharya, T. Poonam, "Engineering Physics". Oxford University Press, 2015.

3	R. K. Gaur, S. L. Gupta, "Engineering Physics", Dhanpat Rai Publications, 2013.
4	D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017
Reference(s)	
1	R. Wolfson, "Essential University Physics", Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2	D. Halliday, R. Resnick, J. Walker, "Principles of Physics", Wiley Publishers (Indian Edition), 2015.
3	Dattu R Joshi, "Engineering Physics", 1st Edition, Tata McGraw Hill Publications, New Delhi, 2010.
4	B. K. Pandey, S. Chaturvedi, "Engineering Physics", Cengage Learning India, 2017.
5	Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw Hill (Indian Edition), 2017.

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

Course Outcomes		Level
CO1	Gain knowledge about lasers and its applications.	K2
CO2	Understand the importance of mechanics.	K1
CO3	Acquire knowledge on the concepts of thermal physics.	K2
CO4	Understand the concepts of quantum mechanics.	K1
CO5	Comprehend and express their knowledge about applications of quantum mechanics.	K3

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**2**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**3**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO4	**3**	**3**	**1**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**3**	**1**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

CY24001 – ENGINEERING CHEMISTRY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	3	0	0	45	3	40	60	100

Course Objectives

- The objective of this course is to better understanding of basic concepts of chemistry and its applications on engineering domine.
- It imparts knowledge on properties of water and its treatment methods, different types of fuels and its applications.
- It also imparts knowledge about different storage devices.
- This course also highlights the preparation, properties and applications of nanomaterials.
- It also gives basic idea about different types of engineering materials.

UNIT I - WATER TECHNOLOGY **Water Technology:** Introduction – Sources − Impurities − Hardness of water −Estimation of harness of water − Boiler feed water − Boiler troubles (Scale and Sludge, Boiler corrosion, Caustic embrittlement, Priming and Foaming)− Treatment of boiler feed water − Internal treatment (Phosphate, Sodium aluminate, Colloidal, Calgon conditioning) − External treatment (Demineralisation process, Zeolite process) − Desalination process − Reverse Osmosis − Municipal water treatment– Case study.	**9**
UNIT II - FUELS **Fuels:** Introduction − Classification of fuels − Solid fuels − Coal and Coke − Metallurgical coke − Manufacture of metallurgical coke (Otto Hoffmann's by-product oven) − Liquid fuels − Petroleum and Diesel − Synthetic petrol (Bergius process) − Knocking in petrol − Octane number − Knocking in diesel − Cetane number − Power alcohol – Gaseous fuels – Natural gaseous fuel – Synthetic gaseous fuel (CNG, LPG) – Flue gas analysis – ORSAT method.	**9**
UNIT III - ELECTROCHEMICAL STORAGE DEVICES **Batteries:** Introduction – Types of batteries – Primary battery (Dry cell) – Secondary battery (Lead acid battery) – Modern battery (Lithium ion battery) – Fuel cells – H_2-O_2 fuel cell– Solar Cells –Electric vehicles: Working principles –Super capacitors: Types and examples.	**9**
UNIT IV - NANO CHEMISTRY **Nano Materials:**Introduction – Types of nano materials – Nanoparticle, Nanocluster, Nanorod, Nanowire and Nanotube – Preparation of nanomaterials (Sol-gel, Solvothermal, Chemical vapour deposition (CVD), Electro chemical deposition (ECD), Laser ablation and Electro spinning methods) – Applications of nanomaterials.	**9**
UNIT V - ENGINEERING MATERIALS **Engineering Polymers:** Introduction – Types of polymers (Natural and Synthetic polymers) – Polymerization – Types of polymerization (Addition polymerization and Condensation polymerization) –Degree of polymerization – Thermosetting and Thermoplastic polymers–	

Application of polymers.	**9**
Total Hours	**45**

Textbook(s)	
1	P. C. Jain and Monica Jain, "A Text Book of Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company Pvt Ltd, New Delhi, 2020.
2	Shashi Chawla "A Text Book of Engineering Chemistry" 3rd Edition, Dhanpat Rai Publishing Company Pvt Ltd, New Delhi, 2011.
3	S. S. Dara and S. S. Umare "A Text Book of Engineering Chemistry", 12th Edition, S. Chand & Company Publishing, 2018.
4	B. Sivasankar, "Engineering Chemistry", Tata McGraw Hill Publishing Company Ltd, New Delhi, 2008.
Reference(s)	
1	Shikha Agarwal, "Engineering Chemistry - Fundamentals and Applications", 2nd Edition, Cambridge University Press, New Delhi, 2019.
2	B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath, James Murday, "Text Book of Nanoscience and Nanotechnology", Universities Press – IIM Series in Metallurgy and Materials Science, 2018.
3	V. R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar, "Polymer Science" New Age International Publishers, 2009.

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

Course Outcomes		**Level**
CO1	Knowledge about different types of water and propose suitable methods for treatment of water.	K1
CO2	Customize various types of fuels for engineering processes and applications.	K3
CO3	Dramatize different storage devices and apply the concepts in engineering energy sectors.	K3
CO4	Identify and apply the basic concepts of nanotechnology and design the synthesis of nano materials for the applications of engineering and technology.	K1
CO5	Summarize the types of engineering materials and their suitable applications in recent technologies.	K2

Mapping with Program Outcomes

Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**	**2**	**2**	**1**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO2	**2**	**-**	**-**	**1**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**1**	**1**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**1**	**2**	**1**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

ES24001 – ENGINEERING GRAPHICS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	2	0	4	60	4	40	60	100

Course Objectives

- Drawing engineering curves and free hand sketch of simple objects.
- Drawing orthographic projection of points, lines and plane surface.
- Drawing orthographic projection of solids.
- Drawing development of solids and section of solids.
- Drawing isometric and perspective projections of simple solids.

CONCETPS AND CONVENTIONS (Not for Examination) Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning. **UNIT I - PLANE CURVES AND FREE HAND SKETCHING** Basic Geometrical constructions, Curves used in engineering practices: Conics - Construction of ellipse, parabola and hyperbola by eccentricity method - Construction of cycloid - construction of involutes of square and circle - Drawing of tangents and normal to the above curves.	**12**
UNIT II - PROJECTION OF POINTS, LINES AND PLANE SURFACE Orthographic projection – principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only first angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of Planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.	**12**
UNIT III - PROJECTION OF SOLIDS Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method and auxiliary plane method.	**12**
UNIT IV - PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other-obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids-Prisms, Pyramids cylinders and cones.	**12**

UNIT V - ISOMETRIC AND PERSPECTIVE PROJECTIONS Principles of isometric projection - isometric scale - Isometric projections of simple solids and truncated solids- Prisms, Pyramids cylinders and cones. Combination of two solid objects vertical positions. Perspective projection of simple solids- Prisms, Pyramids and cylinders by visual ray method. Computer assisted isometric and perspective projections.	**12**
Total Hours	**60**

Textbook(s)	
1	N. D. Bhatt,V. M. Panchal, "Engineering Drawing", 53rd Edition, Charotar Publishing House, 2019.
2	K. V. Natrajan,"A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3	N. S. Parthasarathy, Vela Murali, "Engineering Drawing", Oxford University Press, 2015.
Reference(s)	
1	Basant Agarwal,C. M. Agarwal, "Engineering Drawing", McGraw Hill, 2ndEdition, 2019.
2	K. R. Gopalakrishna, "Engineering Drawing" (Vol.I & II combined), 27th Edition, Subhas Publications, Bangalore, 2017.
3	J. Luzzader, Warren,M. Duff, John, "Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4	N. S. Parthasarathy, Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5	M. B. Shah, B. C. Rana, "Engineering Drawing", 2ndEdition, Pearson Education India, 2009.
6	K. Venugopal,V. Prabhu Raja, "Engineering Graphics", New Age International (P) Ltd, 2008.

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

Course Outcomes		**Level**
CO1	Familiarize with the fundamentals and standards of engineering drawing. Construct the conic curves, in volutes and cycloid, and perform free hand sketching of basic geometrical constructions and multiple views of objects.	K3
CO2	Draw the orthographic projections of points, lines and plane surfaces.	K4
CO3	Draw the projection of simple solids.	K3
CO4	Draw the projection of sectioned solids and draw the development of surfaces of simple solids.	K3
CO5	Visualize and projections of Isometric and perspective projections of simple solids.	K5

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**	**1**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**2**	**2**	**-**
CO2	**3**	**1**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**2**	**2**	**-**
CO3	**3**	**1**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**2**	**2**	**-**

CO4	**3**	**1**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**2**	**2**	**-**
CO5	**3**	**1**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**2**	**2**	**-**
3 – Strong, 2 – Medium, 1 – Low															

TA24001 – HERITAGE OF TAMILS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	1	0	0	15	1	40	60	100

Course Objectives

- To learn the extensive literature of classical tamil.
- To review the fine arts heritage of tamil culture.
- To realize the contribution in Indian freedom struggle.
- To understand the role of Temple in Sangam cities/ports, Chola conquest.
- To examine Tamil cultural influence in India.

UNIT I - LANGUAGE AND LITERATURE 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.	**3**
UNIT II - HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari.	**3**
UNIT III - FOLK AND MARTIAL ARTS Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.	**3**
UNIT IV - THINAI CONCEPT OF TAMILS 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.	**3**
UNIT V - CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement Inscriptions & Manuscripts.	**3**
Total Hours	**15**

Textbook(s)

1	தமிழக வரலாறு - மக்களும் பண்பாடும், கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு

	பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித் தமிழ் – முனைவர். இல சுந்தரம் (விகடன் பிரசுரம்).
3	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4	பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
Reference(s)	
1	Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL (in print).
2	Social Life of the Tamils - The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies
3	Historical Heritage of the Tamils (Dr. S. V. Subramanian, Dr. K. D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4	The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies).
5	Keeladi - 'Sangam City Civilization on the banks of River Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
6	Studies in the History of India with Special Reference to Tamil Nadu (Dr. K. K. Pillay) (Published by: The Author).
7	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
8	Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL).

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

Course Outcomes		**Level**
CO1	Remember the extensive literature of tamil and its classical nature, musical instruments, Folk, Thinai concept, Indian Freedom Struggle & Aham, Puram and Aram Concept.	K1
CO2	Remember the principles in Thirukural, Bakthi Literature Azhwars and Nayanmars, heritage of sculpture, painting ancient people.	K1
CO3	Understand on folk and martial arts of tamil people, Justice in Sangam Literature, Development of Modern literature in Tamil, Making of musical instruments.	K2
CO4	Understand the Ancient Cities and Ports of Sangam Age of Tamils	K2
CO5	Understand the Cultural Influence of Tamils over the other parts of India, contribution of Tamils self-esteem movement.	K1

Mapping with Program Outcomes

Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**3**	**-**	**-**	**-**
CO2	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**3**	**-**	**-**	**-**

CO3	-	-	-	-	-	-	**3**	**3**	-	**3**	-	**3**	-	-	-
CO4	-	-	-	-	-	-	**3**	**3**	-	**3**	-	**3**	-	-	-
CO5	-	-	-	-	-	-	**3**	**3**	-	**3**	-	**3**	-	-	-
3 – Strong, 2 – Medium, 1 – Low															

TA24001 – தமிழர் மரபு								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ES	Total
I	1	0	0	15	1	40	60	100

Course Objectives

- விரிவான இலக்கியம் மற்றும் செம்மொழி தமிழ் கற்க.
- தமிழ் கலாச்சாரத்தின் நுண்கலை பாரம்பரியத்தை மதிப்பாய்வு செய்ய.
- இந்திய சுதந்திரப் போராட்டத்தில் பங்களிப்பை உணர வேண்டும்.
- சங்க நகரங்கள்/துறைமுகங்களில் கோயிலின் பங்கைப் புரிந்து கொள்ள, சோழர்களின் வெற்றி.
- இந்தியாவில் தமிழ் கலாச்சார தாக்கத்தை ஆய்வு செய்ய.

அலகு I - மொழி மற்றும் இலக்கியம் இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை திருக்குறளில் மேலாண்மைக் கருத்துக்கள் தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் -பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் சிற்றிலக்கியங்கள் தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி.	**3**
அலகு II - மரபு பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - நாட்டுப்புறத் தெய்வங்கள் குமரிமுனையில் திருவள்ளுவர் சிலை .	**3**
அலகு III - நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் தெருக்கூத்து கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து. ஓயிலாட்டம் தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.	**3**
அலகு IV - தமிழர்களின் திணைக் கோட்பாடுகள் தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும்.	**3**

அலகு V - இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம், கையெழுத்துப்படிகள்.	**3**
Total Hours	**15**

Textbook(s)	
1	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித் தமிழ் - முனைவர் இல சுந்தரம் (விகடன் பிரசுரம்).
3	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4	பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).

Reference(s)	
1	Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print).
2	Social Life of the Tamils - The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies).
3	Historical Heritage of the Tamils (Dr. S.V. Subramanian, Dr. K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4	The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies).
5	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
6	Studies in the History of India with Special Reference to Tamil Nadu (Dr. K. K. Pillay) (Published by: The Author).
7	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
8	Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL).

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

Course Outcomes		**Level**
CO1	Remember the extensive literature of tamil and its classical nature, musical instruments, Folk, Thinai concept, Indian Freedom Struggle & Aham, Puram and Aram Concept.	K1

CO2	Remember the principles in Thirukural, Bakthi Literature Azhwars and Nayanmars, heritage of sculpture, painting of ancient people.	K1
CO3	Understand on folk and martial arts of tamil people, Justice in Sangam Literature, Development of Modern literature in Tamil, Making of musical instruments.	K2
CO4	Understand the Ancient Cities and Ports of Sangam Age of Tamils	K2
CO5	Understand the Cultural Influence of Tamils over the other parts of India, contribution of Tamils self-esteem movement.	K1

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	**3**	**3**	-	**3**	-	**3**	-	-	-
CO2	-	-	-	-	-	-	**3**	**3**	-	**3**	-	**3**	-	-	-
CO3	-	-	-	-	-	-	**3**	**3**	-	**3**	-	**3**	-	-	-
CO4	-	-	-	-	-	-	**3**	**3**	-	**3**	-	**3**	-	-	-
CO5	-	-	-	-	-	-	**3**	**3**	-	**3**	-	**3**	-	-	-
3 – Strong, 2 – Medium, 1 – Low															

MN 24001 – OVERVIEW OF ENGINEERING AND TECHNOLOGY

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	3	0	0	45	0	100	0	100

Course Objectives

- To outline the basics of the Civil Engineering.
- To learn the fundamentals of Mechanical Engineering.
- To impart knowledge on fundamental concepts and recent trends in the field of Electrical and Control Systems.
- To provide the overview of the Computer Science and Engineering and AI&DS.
- To provide the overview of Food Technology and Bio Medical Engineering.

UNIT I – INTRODUCTION TO ENGINEERING & TECHNOLOGY Science, Engineering and Technology(E&T), Approaches for a Scientific process vs an Engineering process; Engineering Product Life Cycle, processes in Engineering Design Methodology with few examples; various branches in Engineering and Technology (Traditional and Recent), Impact of E&T on human life, (pros & cons); Activities performed by an Engineer, Interdisciplinary nature of real world problems; Revised Bloom's Taxonomy Levels (BTL)	**9**

UNIT II – OVERVIEW OF CIVIL, MECHANICAL AND AGRICULTURAL ENGINEERING Introduction - Who is a civil Engineer? -Roles and Responsibilities- Scope and Opportunities- Structures -Geo Technical Engineering - Estimation and Costing- Construction - Project Management - Structural Engineering - Irrigation and Water Supply. Introduction - Who is a Mechanical Engineer? - Roles and Responsibilities - Scope and Opportunities – Manufacturing- Design - Automobile-Power Generation - Industrial Engineering- computer aided design and manufacturing - computer integrated manufacturing. Introduction - Who is an Agricultural Engineer? - Difference between Agricultural & Horticultural Engineering - Types of Agricultural Engineering - Processing or Post Harvest Engineering - Farm Power and Machinery Engineering - Soil and Water Conservation Engineering - Environmental Control Engineering - Forestry - Wood Product Engineering - Food Engineering - Scope and Opportunities.	**9**
UNIT III – OVERVIEW OF ELECTRICAL, ELECTRONICS AND COMMUNICATION ENGINEERING Introduction- Different between Electrical Engineer and Electronics Engineer - Roles and Responsibilities - Scope and Opportunities - Power Generation and Consumption - Reason development - Current area of research - Energy audit - Energy utilization -PLC- Embedded control systems and computer based control system- wired and wireless communication- satellite communication- IoT communication network.	**9**
UNIT IV - OVERVIEWOF COMPUTER SCIENCE AND ENGINEERING, CYBER SECURITY & AI &DS Introduction- Different between Computer Science and Engineering and AI&DS - Job Description-Roles and Responsibilities - Scope and Opportunities.Computer hardware and software - programming languages, operating system - application of software-database management system (DBMS) - Computer networks - Internet and computer security- Web technology - Mobile application - Artificial intelligent (AI) - Machine learning(ML) - Internet of things(IoT) - Black chain - Cyber security -Cloud computing.	**9**
UNIT V –OVERVIEW OF FOOD TECHNOLOGY AND BIO MEDICAL ENGINEERING Introduction - Scope and Importance of Food Technology - Historical development and trends in the field - Sources of food - Chemical composition of food - Microorganisms in food - Food borne illness and safety measures - Unit operations in food Processing - Principles and methods of Food Processing - Case studies on successful food products or processes. Introduction-Role of Biomedical Engineer - Scope of Biomedical Engineer- Key Areas: Bio materials, Biomechanics, Biomedical Instrumentation, Medical Devices, Clinical Engineering, Cell and Tissue Engineering-Career Opportunities: Research and Development- Applications and Future Directions.	**9**
Total Hours	**45**
Textbook(s)	

1	"Overview of Engineering and Technology", Lecture Notes from DSCE, 2024.
2	"Introduction to Engineering Technology and Engineering" by Val D Hawks, A Brent Strong, 1st Edition, Pearson Publisher, 2000.
Reference(s)	
1	N. R. Banapurmath,V. S. Yalliwal, "Basics of Mechanical Engineering",Vikas Publishing House, 2021.
2	G. Shanmugam, M. S. Palanichamy, "Basic Civil and Mechanical Engineering", McGraw Hill Education; 1st Edition, 2018.
3	D. P. Kothari, I.J. Nagrath, "Basic Electrical Engineering", 4th Edition, McGraw Hill Education, 2019.
4	Albert Malvino, David J. Bates," Electronic Principles (SIE)", 7th Education, McGraw Hill 2017.
5	Reema Thareja, "Fundamentals of Computer", Oxford University Press, 2016.

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

Course Outcomes		**Level**
CO1	Identify the major areas and relate their current trends in Civil Engineering.	K1
CO2	Explain the principles behind various mechanical systems and components.	K2
CO3	Identify different Electricals and Control Systems applied in the Engineering field.	K3
CO4	Relate the various Electronics and Communication Systems involved in real life.	K4
CO5	Understand the components of computer hardware, software, and operating systems and their applications in real life.	K2

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**	**2**	**2**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**2**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**2**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**-**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**1**	**-**	**-**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 - Low															

BS24001 – ENGINEERING PHYSICS AND CHEMISTRY LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	0	0	4	60	2	60	40	100

ENGINEERING PHYSICS LABORATORY

Course Objectives

- To acquaint the students with practical knowledge of physics principles in various fields such as optics, thermal physics and properties of matter for developing basic experimental skills.
- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To determine error in experimental measurements and techniques used to minimize such errors.
- To make the student as an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS (Any 7 Experiments)	
1. Determination of rigidity modulus of a metallic wire using torsional pendulum.	
2. Determination of Young's modulus – Non-uniform bending method.	
3. Determination of Young's modulus – Uniform bending method.	
4. Determination of Young's modulus – Cantilever method.	
5. Determination of wavelength of the laser using grating.	
6. a) Determination of Acceptance angle and Numerical aperture of an optical fiber. b) Determination of width of the groove using laser.	
7. Determination of thickness of a thin film by air-wedge arrangement.	
8. Determination of velocity of sound and compressibility of liquid using Ultrasonic Interferometer.	
9. Determination of velocity of ultrasonic waves using acoustic grating.	
10. Determination of the band gap of a given semiconducting material.	
11. Determination of Planck's constant and work function using Photoelectric effect.	
12. Determination of frequency of the vibrator using Melde's string arrangement.	
Total Hours	**30**

Reference(s)

1	M. N. Srinivasan, S. Balasubramanian, R. Ranganathan, "Practical Physics", S. Chand & Sons Educational Publications, New Delhi, 2011.
2	P. R Sasikumar, "Practical Physics", PHI Learning Pvt. Ltd., New Delhi, 2011.

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

Course Outcomes		Level
CO1	Upon completion of the course, the students will be able to apply principles of elasticity, optics and thermal properties for engineering applications.	K1
CO2	Use graphical models to analyze laboratory data.	K2
CO3	Use mathematical models as a medium for quantitative reasoning and	K2

	describing physical reality.	
CO4	Access, process and analyze scientific information.	K3
CO5	Solve problems individually and collaboratively	K3

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

ENGINEERING CHEMISTRY LABORATORY	
Course Objectives • To make the students to acquire practical skills in basic understanding of water quality parameters such as, hardness, alkalinity, acidity, DO, chloride and copper content. • To induce the students to familiarize with electro analytical techniques such as, conductometry, potentiometry and pH metry. • To demonstrate the synthesis of nano particles. • To develop skills on analysis of coal.	
LIST OF EXPERIMENTS: (Any 7 Experiments)	
1. Estimation of acidity of a water sample using the primary standard.	
2. Determination of types and amount of alkalinity in water sample.	
3. Determination of total, temporary & permanent hardness of water by EDTA method.	
4. Determination of DO content of water sample by Winkler's method.	
5. Determination of chloride content of water sample by Argentometric method.	
6. Estimation of copper content of the given solution by Iodometry.	
7. Estimation of TDS of a water sample by gravimetry.	
8. Determination of strength of strong acid using conductivity meter.	
9. Determination of strength of acids in a mixture of acids using conductivity meter.	
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)	
11. Determination of strength of given hydrochloric acid using pH meter.	
12. Estimation of iron content of the given solution using potentiometer.	
13. Estimation of sodium/potassium present in water using flame photometer.	

14. Preparation of nano particles (TiO_2/ZnO/CuO) by Sol-Gel method.		
15. Proximate analysis of Coal		
	Total Hours	**30**
Reference(s)		
1	J. Mendham, R. C. Denney, J. D. Barnes, M. Thomas, B. Sivasankar, "Vogel's Text Book of Quantitative Chemical Analysis", (2009).	
2	G. H. Jeffery, J. Bassett, J. Mendham, R. C. Denney, "Vogel's Text Book of Quantitative Chemical Analysis, 5th Edition, 2009.	

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

	Course Outcomes	Level
CO1	Analyze the quality of water samples with respect to their hardness, alkalinity, acidity and DO.	K4
CO2	Determine the amount of metal ions through volumetric and spectroscopic techniques.	K4
CO3	Analyze and determine the composition of coals.	K3
CO4	Learn simple method of synthesis of nano particles.	K1
CO5	Quantitatively analyze the impurities in solution by electro analytical techniques.	K2

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**-**	**1**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
CO2	**3**	**1**	**2**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO3	**3**	**2**	**1**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**1**	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**1**	**2**	**-**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

ES24002 – ENGINEERING PRACTICES LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	0	0	4	60	2	60	40	100

Course Objectives

- Prepare pipe line plan; laying and connecting various pipe fittings used in common household plumbing work. Making joints in wood materials used in common household wood work.
- Prepare various welding joints in steel plates using arc welding work
- Wiring various electrical joints in common household electrical wire work.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

CIVIL ENGINEERING PRACTICES:

PLUMBING WORK:

- Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
- Preparing plumbing line sketches.
- Laying pipe connection to the suction side of a pump.
- Laying pipe connection to the delivery side of a pump.
- Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

- Sawing
- Planning
- Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

WOOD WORK STUDY:

- Studying joints indoor panels and wooden furniture.
- Studying common industrial trusses using models.

ELECTRICAL ENGINEERING PRACTICES :

- Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
- Staircase wiring
- Fluorescent Lamp wiring with introduction to CFL and LED types.
- Energy meter wiring and related calculations/ calibration
- Study of Iron Box wiring and assembly
- Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)

• Study of emergency lamp wiring/Water heater	
MECHANICAL ENGINEERING PRACTICES :	
WELDING WORK: • Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding. • Practicing gas welding • Making of models.	
BASIC MACHINING WORK: • (simple) Turning. • (simple) Drilling. • (simple) Tapping.	
SHEET METAL WORK: • Making of as square tray.	
FOUNDRY WORK: • Demonstrating basic foundry operations.	
ELECTRONIC ENGINEERING PRACTICES:	
SOLDERING WORK: • Soldering simple electronic circuits and checking continuity	
ELECTRONIC ASSEMBLY AND TESTING WORK: • Assembling and testing electronic components on a small PCB.	
ELECTRONIC EQUIPMENT STUDY: • Study elements of smart phone. • Study of TV parts and working. • Assembly and dismantle of computer/ laptop	
Total Hours	**60**
Reference(s)	
1.	Shoop, Charles Franklin, "Mechanical Engineering Practice: A Laboratory reference text", McGraw-Hill Publisher, 1956.
2.	S Gowri, T Jayapoovan, "Engineering Practices Lab Manual", Vikas Publishing House, 2011.

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

Course Outcomes		Level
CO1	Draw pipe line plan; layout and connect various pipe fittings used in common household plumbing work; make joints in wood materials used in common household wood work.	K1
CO2	Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assembles simple mechanical common household equipments; Make a tray out of metal sheet using sheet metal work.	K2
CO3	Wire various electrical joints in common household electrical wire work.	K2

CO4	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.	K2

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**2**	**1**	**1**
CO2	**3**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**2**	**1**	**1**
CO3	**3**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**2**	**1**	**1**
CO4	**3**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**2**	**1**	**1**
CO5	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

HS24002-COMMUNICATIVE LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	0	0	2	30	1	60	40	100

Course Objectives

- To enable learners to understand the basics of communication.
- To empower learners to use narrative techniques to convey ideas and experiences in academic and work environment.
- To support learners in enhancing their linguistic competence and engaging in effortless dialogue.
- To assist learners in mastering language for the successful academic and professional communication.
- To strengthen language proficiency for effective comprehension of core curricula.

Basics of Communication **Listening -** Telephone conversation, Listening to Podcast, NEWS, Interviews **Speaking -** Verbal and Non-Verbal Conversation, Role play **Reading -** Types of Reading- Skimming, Scanning, Intensive and Extensive - finding key information in a given text	**6**
Narrative Skill Development **Listening -** Watching travel documentary **Speaking -** Narrating a story -Narrating a personal incident **Reading -** Reading Travelogues, Blogs	**6**
Enriching Speaking Skills **Listening -**Dialogues & Conversations	**6**

Speaking -Group Conversation, Speaking on given topics and context **Reading -** Reading Newspaper Articles, Reading user manuals	
Language Enhancement **Listening -** Listening to TED Talks, **Speaking -** Speaking about friends/places/hobbies, Delivering Welcome Address **Reading -** Reading Biography, Reading Editorial.	**6**
Technical Usage of Language **Listening -** Listening to native dialects & live commentaries **Speaking -** Group Discussion, Debates, Proposing Vote of Thanks **Reading -** Opinion articles, Journal Reports	**6**
Total Hours	**30**

Reference(s)	
1	English for Academic Correspondence and Socializing by Adrian Wall work, Springer, 2011.
2	Ashraf Rizvi, "Effective Technical Communication", 2nd Edition, McGraw-Hill India, 2017.

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

Course Outcomes		**Level**
CO1	Communicate effectively using grammatical words according to the context.	K3
CO2	Analyze the given context and frame content accordingly using narrative skills.	K4
CO3	Effectively use language techniques in extended discussions.	K3
CO4	Frame short and long sentences using grammatical techniques according to given context.	K3
CO5	Respond with clarity and accuracy in a range of professional situations, using appropriate linguistic accuracy.	K4

Mapping with Program Outcomes

Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**2**	**3**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
CO2	**2**	**3**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
CO3	**2**	**2**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
CO5	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
3 - Strong, 2 - Medium, 1 – Low															

HS24003– COMMUNICATIVE ENGLISH – II								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
II	3	0	0	45	3	40	60	100

Course Objective

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write convincing job applications and effective reports.
- Develop their speaking skills to make technical presentations, participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.
- Explore the business communication knowledge and understand the importance of presentation.

UNIT I - INTRODUCTION TO TECHNICAL ENGLISH Listening - Listening to talks mostly of a scientific/technical nature and completing information-gap exercises Speaking - Asking for and giving directions Reading - reading short technical texts from journals- news papers Writing - purpose statements – extended definitions – writing instructions – checklists- recommendations Language Development - subject verb agreement - compound words	**9**
UNIT II - READING AND STUDY SKILLS Listening - Listening to longer technical talks and completing exercises based on them- Speaking – Describing a process Reading – Reading longer technical texts- identifying the various transitions in a text- paragraphing Writing - Interpreting charts, graphs Vocabulary Development-vocabulary used in formal letters/emails and reports Language Development - Impersonal passive voice, numerical adjectives.	**9**
UNIT III - TECHNICAL WRITING AND GRAMMAR Listening - Listening to classroom lectures/ talks on engineering/technology Speaking - Introduction to technical presentations Reading – longer texts both general and technical, practice in speed reading; Writing - Describing a process, use of sequence words Vocabulary Development - sequence words- Misspelled words. Language Development - embedded sentences.	**9**
UNIT IV - PROFESSIONAL WRITING Listening - Listening to documentaries and making notes. Speaking – mechanics of presentations Reading – reading for detailed comprehension Writing - email etiquette - job application – cover letter – Resume preparation (digital and paper based) – analytical essays and issue based essays Vocabulary Development - finding suitable synonyms-paraphrasing Language Development - clauses- if conditionals.	**9**
UNIT V - BUSINESS COMMUNICATION Listening - TED/Ink talks	**9**

Speaking – participating in a group discussion Reading – reading and understanding technical articles Writing – Writing reports - accident and survey report – Memos – Notices - Circulars - Minutes of a meeting - Vocabulary Development- verbal analogies- reported speech.	
Total Hours	**45**

Textbook(s)	
1	Swan Michael- Practical English Usage- Oxford University Press.
2	.Thomson.A.J and Martinet. A. V - A practical English Grammar- Oxford India.
Reference(s)	
1	Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi,2014.
2	Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015.
3	Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4	Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007.
5	Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007.
6	Troyka & Hesse – Handbook for writers- Pearson Publication, 11th edition, 2017.

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

	Course Outcome	Level
CO1	Use proper technical vocabulary and grammar in appropriate contexts.	K1
CO2	Enhance speaking skills to participate confidently in formal / informal conversations and to do effective Presentations/Discussions.	K2
CO3	Critically read and analyze technical texts and articles of a general kind.	K1
CO4	Acquire a working knowledge of writing strategies, formats and templates of professional writing.	K2
CO5	Analyze different way of communication and get familiarized with proper presentation.	K1

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**1**	**1**	**1**	**1**	**2**	**2**	**0**	**0**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
CO2	**0**	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
CO3	**1**	**1**	**0**	**1**	**2**	**1**	**1**	**0**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
CO4	**0**	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
CO5	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

SEMESTER-II

HS24003– COMMUNICATIVE ENGLISH – II								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
II	3	0	0	45	3	40	60	100

Course Objective

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write convincing job applications and effective reports.
- Develop their speaking skills to make technical presentations, participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.
- Explore the business communication knowledge and understand the importance of presentation.

UNIT I - INTRODUCTION TO TECHNICAL ENGLISH Listening - Listening to talks mostly of a scientific/technical nature and completing information-gap exercises Speaking - Asking for and giving directions Reading - reading short technical texts from journals- news papers Writing - purpose statements – extended definitions – writing instructions – checklists- recommendations Language Development - subject verb agreement - compound words	**9**
UNIT II - READING AND STUDY SKILLS Listening - Listening to longer technical talks and completing exercises based on them- Speaking – Describing a process Reading – Reading longer technical texts- identifying the various transitions in a text- paragraphing Writing - Interpreting charts, graphs Vocabulary Development-vocabulary used in formal letters/emails and reports Language Development - Impersonal passive voice, numerical adjectives.	**9**
UNIT III - TECHNICAL WRITING AND GRAMMAR Listening - Listening to classroom lectures/ talks on engineering/technology Speaking - Introduction to technical presentations Reading – longer texts both general and technical, practice in speed reading; Writing - Describing a process, use of sequence words Vocabulary Development - sequence words- Misspelled words. Language Development - embedded sentences.	**9**
UNIT IV - PROFESSIONAL WRITING Listening - Listening to documentaries and making notes. Speaking – mechanics of presentations Reading – reading for detailed comprehension Writing - email etiquette - job application – cover letter – Resume preparation (digital and paper based) – analytical essays and issue based essays Vocabulary Development - finding suitable synonyms-paraphrasing Language Development - clauses- if conditionals.	**9**

UNIT V - BUSINESS COMMUNICATION Listening - TED/Ink talks Speaking – participating in a group discussion Reading – reading and understanding technical articles Writing – Writing reports - accident and survey report – Memos – Notices - Circulars - Minutes of a meeting - Vocabulary Development- verbal analogies- reported speech.	**9**
Total Hours	**45**

Textbook(s)	
1	Swan Michael- Practical English Usage- Oxford University Press.
2	.Thomson.A.J and Martinet. A. V - A practical English Grammar- Oxford India.
Reference(s)	
1	Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi,2014.
2	Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015.
3	Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4	Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007.
5	Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007.
6	Troyka & Hesse – Handbook for writers- Pearson Publication, 11th edition, 2017.

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

Course Outcome		**Level**
CO1	Use proper technical vocabulary and grammar in appropriate contexts.	K1
CO2	Enhance speaking skills to participate confidently in formal / informal conversations and to do effective Presentations/Discussions.	K2
CO3	Critically read and analyze technical texts and articles of a general kind.	K1
CO4	Acquire a working knowledge of writing strategies, formats and templates of professional writing.	K2
CO5	Analyze different way of communication and get familiarized with proper presentation.	K1

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**1**	**1**	**1**	**1**	**2**	**2**	**0**	**0**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
CO2	**0**	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
CO3	**1**	**1**	**0**	**1**	**2**	**1**	**1**	**0**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
CO4	**0**	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**2**	**3**	**3**	**3**	**-**	**-**	**-**
CO5	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

MA24002 – STATISTICS AND NUMERICAL METHODS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
II	3	1	0	60	4	40	60	100

Course Objective

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I NON- PARAMETRIC TESTS Introduction - The Sign test - The Signed - Rank test - Rank - sum tests - The U test - The H test - Tests based on Runs - Test of randomness - The Kolmogorov Tests.	**9+3**
UNIT II - DESIGN OF EXPERIMENTS One way and two way classifications - Completely randomized design – Randomized block design – Latin square design**.**	**9+3**
UNIT III - SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi's method for symmetric matrices.	**9+3**
UNIT IV - INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical single integrations using Trapezoidal and Simpson's 1/3 rules.	**9+3**
UNIT V - NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.	**9+3**
Total Hours	**60**

Textbook(s)

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

2	Johnson, R.A., Miller, I and Freund J., “Miller and Freund’s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
Reference(s)	
1	Burden, R.L and Faires, J.D, "Numerical Analysis”, 9th Edition, Cengage Learning, 2016.
2	Devore. J.L., "Probability and Statistics for Engineering and the Sciences”, Cengage Learning, New Delhi, 8th Edition, 2014.
3	Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis” Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4	Gupta S.C. and Kapoor V. K., “Fundamentals of Mathematical Statistics”, Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5	Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum’s Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., “Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

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

Course Outcome		**Level**
CO1	Upon successful completion of the course, students will be able to: Apply the concept of testing of hypothesis for small and large samples in real life problems.	K1
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.	K4
CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	K2
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	K3
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	K2

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-
CO2	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-
CO3	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-
CO4	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-

CO5	3	3	1	1	1	-	-	-	2	-	2	3	-	-	-
3 – Strong, 2 – Medium, 1 – Low															

PH24002 - PHYSICS FOR ELECTRONICS ENGINEERING								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
II	3	0	0	45	3	40	60	100

Course Objective

- To make the students effectively understand the nature of conductors.
- To impart knowledge on semiconductor physics and its applications.
- To introduce the concepts of magnetic materials.
- To understand the importance of optical materials.
- To enable the students understand the applications of nano materials.

UNIT I - ELECTRICAL PROPERTIES OF MATERIALS Classical free electron theory – Expression for electrical conductivity – Thermal conductivity – Wiedemann-Franz law – Success and failures of CFE– Quantum free electron theory : degenerate states – Fermi- Dirac statistics –Effect of temperature on fermi function – Density of energy states – Energy bands in solids.	**9**
UNIT II - SEMI CONDUCTORS AND ITS PROPERTIES Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in an intrinsic semiconductor – extrinsic semiconductors – Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductor: random motion, drift, mobility and diffusion – Hall effect and devices.	**9**
UNIT III - MAGNETIC MATERIALS AND SUPER CONDUCTORS Magnetic dipole moment – magnetic induction - magnetic permeability and susceptibility – Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism– para magnetism in the conduction electrons in metals – hard and soft magnetic materials – GMR devices. Introduction to super conductors – properties – types of superconductos – Application – magnetic levitation and SQUID.	**9**
UNIT IV - OPTICAL PROPERTIES OF MATERIALS Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain – Optoelectronic devices: light detectors and solar cells – light emitting diode - optical processes in organic semiconductor devices.	**9**
UNIT V - NANO DEVICES Density of states for solids – Quantum confinement – Quantum structures – Density of states	**9**

for quantum wells, wires and dots – Band gap of nano materials –synthesis of nano materials – top down and bottom up process – pulsed laser method and chemical vapour deposition method – Carbon nanotubes: Properties and applications.	
Total Hours	**45**

Textbook(s)	
1	Kasap, S.O., "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007.
2	Umesh K Mishra and Jasprit Singh, "Semiconductor Device Physics and Design", Springer, 2008.
3	Wahab, M.A., "Solid State Physics: Structure and Properties of Materials", Narosa Publishing House, 2009.
Reference(s)	
1	Halliday, D., Resnick, R. and Walker. J, "Principles of Physics", Wiley, 2015.
2	Avathanulu, M.N. and Kshirsagar, P.G., "Engineering Physics", S. Chand and company, 2014.
3	Arthur Beiser, "Concepts of Modern Physics", Tata McGraw Hill, 2009.
4	Pillai, S.O., "Solid State Physics", New age International Publishers, 7th Edition, 2015

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

Course Outcome		**Level**
CO1	Express their knowledge in understanding the electrical properties of materials.	K1
CO2	Able to gain knowledge on semi conducting materials.	K2
CO3	Understand the concepts of magnetic storage devices.	K1
CO4	Gain knowledge about opto electronic devices.	K2
CO5	Demonstrate a strong foundational knowledge in nano devices	K3

Mapping with Program Outcomes

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
3 – Strong, 2 – Medium, 1 – Low															

EC24001 – ELECTRON DEVICES AND CIRCUIT THEORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
II	3	0	0	45	3	40	60	100

Course Objective

- Understand the behavior of semiconductor diodes in various applications.
- Learn the operation of BJT and FET.
- Construct simple electronic circuits using special semiconductor devices.
- Remember the fundamental laws of electric circuits.
- Analyze the response of electric circuits using network theorems.

UNIT I - SEMICONDUCTOR DIODES 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 and its applications.	**9**
UNIT II - TRANSISTORS Bipolar Junction Transistor - NPN - PNP – Operations - Early effect – Current Equations - Input and Output characteristics of CE, CB, CC – Field Effect Transistors - JFET, MOSFET- D-MOSFET, E-MOSFET- Characteristics.	**9**
UNIT III - SPECIAL SEMICONDUCTOR DEVICES AND APPLICATIONS Tunnel diode, Varactor diode, UJT, SCR, DIAC, TRIAC, Power BJT- Power MOSFET-MOSVMOS. LED, Photo transistor, Opto Coupler.	**9**
UNIT IV - BASIC CIRCUIT ANALYSIS Resistive elements - Ohms Law- Kirchhoff's current and voltage laws - series and parallel connection of independent sources - R, L and C, source transformation, Mesh current and Node voltage with AC and DC Analysis - methods of analysis, star delta conversion. Transient response of RL, RC and RLC circuits using Laplace Transform for DC input and ACsinusoidal input.	**9**
UNIT V - NETWORK THEOREMS Thevenin and Norton Theorems - Superposition Theorem - Maximum power transfer theorem - Reciprocity Theorem - Millman's theorem.	**9**
Total Hours	**45**

Textbook(s)

1	Charles K. Alexander, Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill, 2022.
2	Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, 2017.

Reference(s)

1	W.H.Hayt, J.E.Kemmerly&S.M.Durbin, Engineering Circuit Analysis, 9thEdition, McGraw Hill Education, New Delhi, India, 2019.
2	Joseph Edminister and MahmoodNahvi, ―Electric Circuits, Schaum's Outline Series, 5th Edition

	Reprint,Tata McGraw Hill Publishing Company, New Delhi, 2016.
3	David A Bell, Electric Circuits and Electronic Devices, Oxford University Press, 2010.
4	Thomas L.Floyd, Electronic Devices, 9th Edition, Pearson, 2017.
5	Donald A Neaman, Semiconductor Physics and Devices, 4th Edition, McGraw Hill, 2017.
6	Dr.R.S. Sedha, A Textbook of Applied Electronics, S Chand and company limited, 2019.

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

Course Outcome		Level
CO1	Examine the performance of electronic circuits using PN junction diode and Zener diode.	K1
CO2	Construct electronic circuits using BJT and FET to sketch the input and output characteristics.	K1
CO3	Demonstrate the behavior of special semiconductor devices in various applications.	K3
CO4	Comprehend the impact of voltage and current in electric circuits using Mesh and Nodal methods.	K3
CO5	Relate various network theorems to determine the response of the electric circuits.	K1

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
CO2	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
CO3	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
CO4	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
CO5	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
3 – Strong, 2 – Medium, 1 – Low															

CS24001-PROBLEM SOLVING AND PYTHON PROGRAMMING								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	3	1	0	60	4	40	60	100

Course Objectives

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I INTRODUCTION TO PROBLEM SOLVING Fundamentals of Computing, Identification of computational problems, Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).	**12**
UNIT II BASICS OF PYTHON PROGRAMMING Introduction: Features, Installation, Modes of operations (interpreter and interactive mode); variables and data types: int, float, boolean, string, and list; expressions, statements, operators and comments; modules and functions.	**12**
UNIT III CONTROL STATEMENTS & FUNCTIONS Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values,parameters, local and global scope, function composition, recursion.	**12**
UNIT IV SEQUENTIAL DATA TYPES Strings: String slices, String functions and methods, immutability; Lists: list operations, list slices, list methods, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension.	**12**
UNIT V FILES HANDLING AND EXCEPTIONS Files Handling: File types and operations (open, close, read and write), file positions; command line arguments; Exceptions : Introduction to errors and exceptions, handling exceptions, modules, packages.	**12**
Total Hours	**60**

Textbook(s)

1	Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

2	Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.
Reference(s)	
1	Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2	G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3	John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021.
4	Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5	Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

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

Course Outcomes		Level
CO1	Develop algorithmic solutions to simple computational problems.	K3
CO2	Develop and execute simple Python programs.	K3
CO3	Write simple Python programs using conditionals and loops for solving problems.	K2
CO4	Represent compound data using Python lists, tuples, dictionaries etc.	K2
CO5	Read and write data from/to files in Python programs.	K3

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**3**	**3**	**-**
CO2	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**3**	**-**	**-**
CO3	**3**	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**3**	**-**	**-**
CO4	**2**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**3**	**-**	**-**
CO5	**1**	**2**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

TA24002 – TAMILS AND TECHNOLOGY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
II	1	0	0	15	1	40	60	100

Course Objective

- Explore the historical development of technology in the Tamil region.
- Examine how traditional Tamil practices and knowledge systems have influenced technological advancements
- Promote inclusivity and diversity in the technology sector, encouraging the participation of Tamils in various technological fields.
- Provide a global perspective on Tamil contributions to technology and the role of Tamils in the global technology landscape.
- Explore the role of the Tamil language in technology, including the development of software, language processing, and digital content in Tamil.

UNIT I - WEAVING AND CERAMIC TECHNOLOGY Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.	**3**
UNIT II - DESIGN AND CONSTRUCTION TECHNOLOGY 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)- ThirumalaiNayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.	**3**
UNIT III - MANUFACTURING TECHNOLOGY 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.	**3**
UNIT IV - AGRICULTURE AND IRRIGATION TECHNOLOGY Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu 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.	**3**
UNIT V - SCIENTIFIC TAMIL & TAMIL COMPUTING 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.	**3**
Total Hours	**15**

Textbook(s)	
1	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (inprint).
2	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
Reference(s)	
1	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies). 8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
2	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
3	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
4	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

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

Course Outcome		Level
CO1	Understand the extensive literature of Tamil and its classical nature.	K1
CO2	Understand the heritage of sculpture, painting and musical instruments of ancient people.	K2
CO3	Review on folk and martial arts of Tamil people.	K2
CO4	Realization of Thinai concepts, trade and victory of chozha dynasty.	K2
CO5	Understand the contribution of Tamils in Indian freedom struggle, self-esteem movement and siddha medicine.	K2

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-

3 – Strong, 2 – Medium, 1 – Low

TA24002 – தமிழரும் தொழில்நுட்பமும்								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
II	1	0	0	15	1	40	60	100

Course Objective

- தமிழ் பிராந்தியத்தில் தொழில்நுட்பத்தின் வரலாற்று வளர்ச்சியை ஆராய்ச்சி செய்யுங்கள்.
- பாரம்பரிய தமிழ் நடைமுறைகளும் அறிவு அமைப்புகளும் தொழில்நுட்ப முன்னேற்றங்களை எவ்வாறு பாதித்துள்ளன என்பதை ஆராயுங்கள்
- பல்வேறு தொழில்நுட்பத் துறைகளில் தமிழர்களின் பங்கேற்பை ஊக்குவித்தல், தொழில்நுட்பத் துறையில் உள்ளடக்கம் மற்றும் பன்முகத்தன்மையை ஊக்குவித்தல்.
- தொழில்நுட்பத்திற்கான தமிழ் பங்களிப்புகள் மற்றும் உலகளாவிய தொழில்நுட்ப நிலப்பரப்பில் தமிழர்களின் பங்கு பற்றிய உலகளாவிய கண்ணோட்டத்தை வழங்கவும்.
- மென்பொருளின் வளர்ச்சி, மொழி செயலாக்கம், தமிழில் டிஜிட்டல் உள்ளடக்கம் உள்ளிட்ட தொழில்நுட்பத்தில் தமிழ் மொழியின் பங்கை ஆராயுங்கள்.

அலகு I - நெசவு மற்றும் பானைத் தொழில்நுட்பம்: சங்க காலத்தில் நெசவுத் தொழில் பானைத் தொழில்நுட்பம் கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.	**3**
அலகு II - வடிவமைப்பு மற்றும் சுட்டிடத் தொழில்நுட்பம் சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு. சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் -மாமல்லபுரச் சிற்பங்களும், கோவில்களும் சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.	**3**
அலகு III - உற்பத்தித் தொழில் நுட்பம் கப்பல் கட்டும் கலை உலோகவியல் - இரும்புத் தொழிற்சாலை இரும்பை உருக்குதல், எஃகு வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் நாணயங்கள் அச்சடித்தல் மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் சங்கு மணிகள் எலும்புத்துண்டுகள் தொல்லியல் சான்றுகள் சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.	**3**
அலகு IV - வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம் அணை, ஏரி குளங்கள், மதகு சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் கால்நடை பராமரிப்பு கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் கடல்சார் அறிவு - மீன்வளம் முத்து மற்றும் முத்துக்குளித்தல்	**3**

பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார சமூகம்.	
அலகு V - அறிவியல் தமிழ் மற்றும் கணித்தமிழ்: அறிவியல் தமிழின் வளர்ச்சி -கணித்தமிழ் வளர்ச்சி தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.	**3**
Total Hours	**15**

Textbook(s)	
1	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித் தமிழ் - முனைவர் இல சுந்தரம். (விகடன் பிரசுரம்).
Reference(s)	
1	Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
2	Studies in the History of India with special reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
3	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

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

Course Outcome		Level
CO1	தமிழின் விரிவான இலக்கியங்களையும் அதன் செம்மொழித் தன்மையையும் புரிந்து கொள்ளுங்கள்.	K1
CO2	பழங்கால மக்களின் சிற்ப ஓவியம் மற்றும் இசைக்கருவிகளின் பாரம்பரியத்தைப் புரிந்து கொள்ளுங்கள்	K2
CO3	தமிழ் மக்களின் நாட்டுப்புற மற்றும் தற்காப்பு கலைகள் பற்றிய ஆய்வு.	K2
CO4	திணை கருத்துக்கள், வர்த்தகம் மற்றும் சோழ வம்சத்தின் வெற்றி.	K2
CO5	இந்திய சுதந்திரப் போராட்டத்திலும், சுயமரியாதை இயக்கத்திலும், சித்த மருத்துவத்திலும் தமிழர்களின் பங்களிப்பைப் புரிந்து கொள்ளுங்கள்	K2

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO2	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO3	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**

CO4	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO5	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

MN 24002 – ENVIRONMENTAL SCIENCE AND SUSTAINABILITY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
II	3	0	0	30	0	100	0	100

Course Objective

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.
- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

UNIT I - ENVIRONMENT AND BIODIVERSITY Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow – ecological succession. Biodiversity - Types of biodiversity: genetic, species and ecosystem biodiversity – Values of biodiversity, India as a megadive/rsity nation – hot-spots of biodiversity – Threats to biodiversity - habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and Endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation.	**6**
UNIT II - ENVIRONMENTAL POLLUTION Causes, Effects and Preventive measures of Air pollution, Water pollution, Soil pollution and Noise pollution. Solid, Hazardous and E-Waste management. Environmental protection, Environmental protection acts.	**6**
UNIT III - RENEWABLE SOURCES OF ENERGY Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.	**6**
UNIT IV - SUSTAINABILITY AND MANAGEMENT Development, GDP, Sustainability - concept, needs and challenges - economic, social and aspects of sustainability - from unsustainability to sustainability - millennium development goals, and protocols - Sustainable Development Goals - targets, indicators and intervention areas Climate change - Global, Regional and Local environmental issues and possible	**6**

solutions - case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry - A case study.	
UNIT V - SUSTAINABILITY PRACTICES Zero waste and R concept, Circular economy, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles - carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization - Socio-economical and technological change.	**6**
Total Hours	**30**

Textbook(s)	
1	Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.
2	Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, New Delhi, 2016.
Reference(s)	
1	R. K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media. 38. Edition, 2010.
2	Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3	Dharmendra S. Sengar, "Environmental law", Prentice hall of India Pvt. Ltd, New Delhi, 2007.
4	Rajagopalan, R, "Environmental Studies - From Crisis to Cure", Oxford University Press, 3rd Edition, 2015.
5	Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

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

Course Outcome		**Level**
CO1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.	K1
CO2	To identify the causes, effects of environmental pollution and natural disasters and contributeto the preventive measures in the society.	K1
CO3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	K3
CO4	To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.	K2
CO5	To demonstrate the knowledge of sustainability practices and identify green materials, energycycles and the role of sustainable urbanization	K3

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**2**	**1**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
CO2	**3**	**2**	**-**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
CO3	**3**	**-**	**1**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
CO4	**3**	**2**	**1**	**1**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**

CO5	**3**	**2**	**1**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

EC24002 – ELECTRON DEVICES AND CIRCUIT THEORY LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
II	0	0	4	60	2	60	40	100

Course Objective

- Explain circuit's behavior using circuit laws
- Understand the behavior of semiconductor device based on experimentation.
- Describe active and passive circuit elements.
- Comprehend the operation and characteristics of transistor and Diode.
- Analyze the characteristics of amplifier gain and frequency response.
- Learn the required functionality of positive and negative feedback systems.

LIST OF EXPERIMENTS:		
1.	PN Junction Diode and Zener diode Characteristics	
2.	Half wave and Full wave Rectifier circuits	
3.	Regulator using Zener diode	
4.	Characteristics of JFET and plot input and output waveforms	
5.	Characteristics of UJT.	
6.	Characteristics of Common Emitter configuration	
7.	Verification of Kirchhoff's Voltage and Current laws	
8.	Verification of Super Position Theorem	
9.	Verification of Thevenin's, Norton's and Maximum Power transfer theorems	
10.	Determination of Resonance frequency of Series & Parallel RLC Circuits	
	Total Hours	**60**

Reference(s)

1	Charles K. Alexander, Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill, 2022.
2	Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, 2017.

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

Course Outcome		Level
CO1	Evaluate the structure and operation of PN junction devices (diode, Zener diode, LED and Laser diode)	K2
CO2	Analyze the verification of Maximum Power transfer theorem.	K2
CO3	Analyze the verification of basic circuit theorems.	K3
CO4	Analyze the performance of various configurations of RLC, LC Circuits	K2
CO5	Describe the operation of various feedback amplifiers and oscillators	K3

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	2	-	-	1	-	-	-	1	3	-	1
CO2	2	3	3	2	2	-	-	1	-	-	-	1	3	-	1
CO3	2	3	3	2	2	-	-	1	-	-	-	1	3	-	1
CO4	2	3	3	2	2	-	-	1	-	-	-	1	3	-	1
CO5	2	3	3	2	2	-	-	1	-	-	-	1	3	-	1
3 – Strong, 2 – Medium, 1 – Low															

CS24002 – PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
I	0	0	4	60	2	60	40	100

Course Objectives

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

LIST OF EXPERIMENTS:

1. a. Write a program for checking the given number is even or odd.
   b. Write a program for displaying reversal of a number.
2. a. Write a program for finding biggest number among 3 numbers.
   b. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
3. a. Implement python script to check the given year is leap year or not.
   b. Implement Python Script to generate first N natural numbers.
4. a. Implement Python Script to generate first N natural numbers.

	b. Implement Python Script to check given number is palindrome or not.
5.	a. Implement Python script to print factorial of a number. b. Implement Python Script to print sum of N natural numbers.
6.	a. Implement Python Script to check given number is Armstrong or not. b. Implement Python Script to generate prime numbers series up to n
7.	Finding the minimum and maximum elements in the lists
8.	Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.
9.	Implement a python script for factorial of number by using recursion
10.	Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
11.	Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
12.	Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
	Total Hours **60**

Reference(s)

1	Paul Deitel, Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2	John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", 3rd Edition, MIT Press, 2021.

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

Course Outcomes		Level
CO1	Develop algorithmic solutions to simple computational problems.	K2
CO2	Develop and execute simple Python programs.	K2
CO3	Write simple Python programs using conditionals and loops for solving problems.	K3
CO4	Decompose a Python program into functions.	K3
CO5	Represent compound data using Python lists, tuples, dictionaries etc.	K3

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**3**	**3**	**-**
CO2	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**3**	**-**	**-**
CO3	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**3**	**-**	**-**
CO4	**2**	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**3**	**-**	**-**
CO5	**1**	**2**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**-**	**-**
3 – Strong, 2 – Medium, 1 - Low															

SEMESTER III

MA24302 – TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	3	1	0	60	4	40	60	100

Course Objective

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To familiarize the method for solving first and second order PDE's with constant coefficient.
- To understand Fourier series of periodic functions and harmonic analysis.
- To explain the concepts and applications of Fourier transforms.
- To introduce z transform and their use in solving difference equations.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS Formation of partial differential equations –Solutions of standard types of first order partial differential equations - First order partial differential equations reducible to standard types- Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.	**12**
UNIT II APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS Classification of PDE – Method of separation of variables - Fourier series solutions of one-dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Cartesian coordinates only).	
UNIT III FOURIER SERIES Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series and cosine series – Root mean square value – Parseval's identity – Harmonic analysis.	**12**
UNIT IV FOURIER TRANSFORMS Statement of Fourier integral theorem– Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity	**12**
UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS Z-transforms - Elementary properties – Convergence of Z-transforms - Initial and final value theorems - Inverse Z-transform using partial fraction and convolution theorem - Formation of difference equations – Solution of difference equations using Z - transforms.	**12**
Total Hours	**60**

Textbook(s)

1	Grewal B.S., "Higher Engineering Mathematics", 44thEdition, Khanna Publishers, New Delhi, 2018.
2	Kreyszig E, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, New Delhi, India, 2018.

Reference(s)	
1	Andrews. L.C and Shivamoggi. B, "Integral Transforms for Engineers" SPIE Press, 1999.
2	Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 10th Edition, Laxmi Publications Pvt. Ltd, 2021.
3	James. G., "Advanced Modern Engineering Mathematics", 4thEdition, Pearson Education, New Delhi, 2016.
4	Narayanan. S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998..
5	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2018.
6	Wylie. R.C. and Barrett. L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

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

Course Outcome		Level
CO1	**Formulate and classify the different types of partial differential equation.**	**K2**
CO2	**Solve linear partial differential equation with constant coefficient using standard methods.**	**K3**
CO3	**Construct Fourier series for various types of functions including half range expansions.**	**K3**
CO4	**Apply Parseval's identity and perform harmonic analysis using Fourier series.**	**K3**
CO5	**Analyze z transform for differential equations**	**K4**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**1**	**3**
CO2	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**1**	**3**
CO3	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**2**	**1**
CO4	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**2**	**2**
CO5	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**2**	**2**
3 – Strong, 2 – Medium, 1 - Low													

EC24301 – ANALOG ELECTRONICS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	3	0	0	45	3	40	60	100

Course Objective

- To introduce the fundamental concepts of BJT and MOSFET biasing.
- To understand the operation and design of multistage and differential amplifiers.
- To explore the principles and applications of feedback in amplifiers and oscillators.
- To design and analyze regulated DC power supplies using rectifiers, filters, and regulators.
- To apply Artificial Intelligence techniques for efficient and adaptive analog circuit design.

UNIT I – BIASING OF BJT AND MOSFET Load line, operating point, biasing methods for BJT and MOSFET, BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response –MOSFET small signal model– Analysis of CS, CG and Source follower – Gain and frequency response- High frequency analysis.	**9**
UNIT II - MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER Cascode amplifier, Differential amplifier – Common mode and Difference mode analysis – MOSFET input stages – tuned amplifiers – Gain and frequency response – Neutralization methods.	**9**
UNIT III - FEEDBACK AMPLIFIERS AND OSCILLATORS Advantages of negative feedback – Voltage / Current, Series , Shunt feedback Amplifiers – positive feedback–Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.	**9**
UNIT IV - POWER SUPPLIES AND RECTIFIERS Linear mode power supply - Rectifiers - Filters - Half-Wave Rectifier Power Supply - Full-Wave Rectifier Power Supply - Voltage regulators: Voltage regulation - Linear series, shunt and switching Voltage Regulators - Over voltage protection	**9**
UNIT V - ANALOG CIRCUITS DESIGN USING AI Introduction to AI, Low-power and energy-efficient analog circuit design, AI and ML based adaptive amplifier design, Short circuit current gain and cut-off frequency analysis using AI.	**9**
Total Hours	**45**

Textbook(s)

1	Donald. A. Neamen, Electronic Circuits Analysis and Design, 3rd Edition, Mc Graw Hill Education (India) Private Ltd., 2010.
2	Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 11th Edition, Pearson Education, 2013.

Reference(s)

1	Millman J, Halkias.C.andSathyabrada Jit, Electronic Devices and Circuits, 4th Edition, Mc Graw Hill Education (India) Private Ltd., 2015.
2	Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, 4th Edition, , Mc Graw Hill Education (India) Private Ltd., 2017.
3	Ali Iranmanesh Hossein Sayadi,AI-Enabled Electronic Circuit and System Design"Springer 2025
4	Floyd, Electronic Devices, Ninth Edition, Pearson Education, 2012.
5	David A. Bell, Electronic Devices & Circuits, 5th Edition, Oxford University Press, 2008.

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

Course Outcome		Level
CO1	**Analyze biasing techniques and small signal models of BJT and MOSFET amplifiers.**	**K4**
CO2	**Examine multistage and differential amplifier configurations and evaluate frequency response.**	**K4**
CO3	**Analyze feedback amplifiers and oscillator circuits based on stability criteria.**	**K4**
CO4	**Analyze DC power supply circuits with rectifiers, filters, and voltage regulators.**	**K4**
CO5	**Apply AI/ML techniques in analog circuit design for performance optimization.**	**K3**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**3**	**3**	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**1**	**2**	**2**	**1**
CO2	**3**	**3**	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**2**	**2**	**1**
CO3	**3**	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**1**	**1**	**2**	**1**
CO4	**3**	**2**	**3**	**2**	**3**	**1**	**-**	**-**	**-**	**1**	**1**	**2**	**1**
CO5	**2**	**2**	**2**	**3**	**3**	**2**	**-**	**-**	**-**	**1**	**1**	**2**	**1**
3 – Strong, 2 – Medium, 1 - Low													

EC24302 – COMMUNICATION SYSTEMS							
Semester	Hours/Week			Total Hours	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Course Objective

- To introduce Analog Modulation Schemes
- To impart knowledge in random process
- To study various Digital techniques
- To introduce the importance of sampling & quantization
- To impart knowledge in demodulation techniques
- To enhance the class room teaching using smart connectivity instruments

UNIT I - MODULATION TECHNIQUES Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals. SSB Generation – Filter and Phase Shift Methods, VSB Generation – Filter Method, Hilbert Transform, Pre-envelope & complex envelope AM techniques, Superheterodyne Receiver.	**9**
UNIT II - ANALOG TECHNIQUES Sampling – Aliasing- Signal Reconstruction-Quantization - Uniform & non-uniform quantization - quantization noise - Nyquist criterion- Logarithmic Companding –PAM, PPM, PWM, PCM –	**9**

TDM, FDM**.**	
UNIT III - DIGITAL TECHNIQUES Pulse modulation Differential pulse code modulation. Delta modulation, Digital Multiplexers, Channel coding theorem - Linear Block codes - Hamming codes - Cyclic codes - Convolutional codes - Viterbi Decoder	**9**
UNIT IV - DIGITAL MODULATION SCHEMES Geometric Representation of signals — Generation, detection, PSD & BER of Coherent BPSK, BFSK & QPSK — QAM — Carrier Synchronization — Structure of Non-coherent Receivers — Principle of DPSK.	**9**
UNIT V - DEMODULATION TECHNIQUES USING IOT Case studies:Smart Noise Detection and Signal Recovery for IoT Sensors. LoRa based Weather Station with coherent Demodulation,ISI simulation in IoT Communication, NB-IoT Signal Demodulator for Smart City Sensors.	**9**
Total Hours	**45**

Textbook(s)	
1	Simon Haykins," Communication Systems", Wiley, 5th Edition, 2009.(Unit I - V)
2	B.P.Lathi, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2011
Reference(s)	
1	Wayner Tomasi, Electronic Communication System, 5th Edition, Pearson Education,2008.
2	D.Roody, J.Coolen, Electronic Communications, 4th edition PHI 2006
3	A.Papoulis, "Probability, Random variables and Stochastic Processes", McGraw Hill, 3rd edition, 1991.
4	B.Sklar, "Digital Communications Fundamentals and Applications", 2nd Edition Pearson Education 2007
5	H P Hsu, Schaum Outline Series - "Analog and Digital Communications" TMH 2006 Couch.L., "Modern Communication Systems", Pearson, 2001

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

Course Outcome		Level
CO1	**understand amplitude modulation techniques**	**K2**
CO2	**Apply knowledge of random processes to analyze communication systems under noise conditions**	**K3**
CO3	**Analyze the effects of sampling and quantization in signal digitization and system performance.**	**K4**
CO4	**Evaluate different demodulation techniques and their role in effective signal recovery.**	**K5**
CO5	**Simulate communication systems incorporating IoT applications and smart connectivity tools.**	**K6**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	1	1				1		
CO2	3	3	3	3	2	1	1				1		
CO3	3	3	3	3	3	1	1				1		
CO4	3	3	3	3	2	1	1				1		
CO5	3	3	3	3	2	1	1				1		
3 – Strong, 2 – Medium, 1 - Low													

EC24303– SIGNALS AND SYSTEMS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	4	0	0	45	4	40	60	100

Course Objective

- To understand the types and basic properties of signal &systems
- To Understand the methods of characterization of LTI systems in time domain
- To analyze continuous time signals and system in the Fourier and Laplace domain
- To analyze discrete time signals and system in the Fourier and Z transform domain
- To study the signal processing techniques using IOT

UNIT I –CLASSIFICATION OF SIGNALS AND SYSTEMS Introduction to Signals and systems, Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids. Operation on Signals, Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals – Classification of systems - CT systems and DT systems— Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable, Invertible and Non-Invertible systems.	**9**
UNIT II –ANALYSIS OF CONTINUOUS TIME SIGNALS Fourier series for periodic signals - Fourier Transform – properties- Laplace Transforms and Properties	**9**
UNIT III – LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS Impulse response - convolution integrals- Differential Equation- Fourier and Laplace transforms in Analysis of CT systems - Systems connected in series / parallel.	
UNIT IV – ANALYSIS OF DISCRETE TIME SIGNALS Baseband signal Sampling–Fourier Transform of discrete time signals (DTFT)– Properties of DTFT-Z Transform & Properties	**9**
UNIT V – IOT SIGNAL PROCESSING APPLICATIONS IoT Signal Processing Applications- Hands-on projects using Arduino/Raspberry Pi – Signal processing with MATLAB – Real-world IoT deployment.	**9**
Total Hours	**45**
Textbook(s)	

1	OppenheimWillskyandHamid,"SignalsandSystems",2ndEdition,PearsonEducation, New Delhi, 2015.
2	SimonHaykin,BarryVanVeen,"SignalsandSystems",2ndEdition,Wiley,2002
3	**Manish Singh, "Signal Processing and Transceiver Programming for IoT Applications", (LAP) Lambert Academic Publishing ,2024**
Reference(s)	
1	B.P.Lathi,"PrinciplesofLinearSystemsandSignals",2nd Edition,Oxford,2009.
2	M.J.Roberts,"SignalsandSystemsAnalysisusingTransformmethodsandMATLAB", McGraw-Hill Education, 2018.
3	OhnAlanStuller,"AnIntroductiontoSignalsandSystems",Thomson,2007.
4	Dimitrios Serpanos and Marilyn Wolf, "Internet-of-Things (IoT) Systems: Architectures, Algorithms, Methodologies", 2018.

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

Course Outcome		Level
CO1	**Classify different types of signals and systems and perform basic arithmetic operations.**	**K2**
CO2	**Analyze continuous-time signals using Fourier Series, Fourier Transforms, and Laplace Transforms.**	**K4**
CO3	**analyze LTI systems in the time and transform domains.**	**K4**
CO4	**Apply Fourier and Z-Transform techniques to study discrete-time signals and systems.**	**K3**
CO5	**Implement basic signal processing techniques using tools like MATLAB and IoT platforms (Arduino/Raspberry Pi).**	**K5**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	3	-	3	2	-	-	-	-	3	-	-
2	3	-	3	-	-	2	-	-	-	-	3	-	3
3	3	3	-	-	3	2	-	-	-	-	3	2	-
4	3	3	-	-	3	2	-	-	-	-	3	-	3
5	3	3	-	3	3	2	-	-	-	-	3	-	3
3 – Strong, 2 – Medium, 1 - Low													

EC24304 – DIGITAL SYSTEM DESIGN								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	3	0	2	60	4	50	50	100

Course Objective

- To present the fundamentals of digital circuits and simplification methods
- To analyze the design of various combinational digital circuits using logic gates
- To bring out the analysis and design procedures for synchronous and asynchronous Sequential circuits
- To learn integrated circuit families.
- To introduce logic families and Programmable logic circuits

UNIT I -BASICS CONCEPTS OF DIGITAL SYSTEM Review of number systems-representation-conversions, Review of Boolean algebra- theorems, sum of product and product of sum simplification, canonical forms min term and max term, Simplification of Boolean expressions-Karnaugh map, completely and incompletely specified functions, Implementation of Boolean expressions using universal gates, Tabulation methods.	**6**
UNIT II -COMBINATIONAL LOGIC CIRCUITS Problem formulation and design of combinational circuits - Code-Converters, Half and Full Adders, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Mux/Demux, Case study: Digital trans-receiver / 8 bit Arithmetic and logic unit, Parity Generator/Checker, Seven Segment display decoder	**6**
UNIT III - SYNCHRONOUS SEQUENTIAL CIRCUITS Latches, Flip flops – SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, state minimization, state assignment,lock - out condition circuit implementation - Counters, Ripple Counters, Ring Counters, Shift registers, Universal Shift Register. Model Development: Designing of rolling display/real time clock	**6**
UNIT IV - ASYNCHRONOUS SEQUENTIAL CIRCUITS Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Fundamental and Pulse mode sequential circuits, Design of Hazard free circuits.	**6**
UNIT V - LOGIC FAMILIES AND PROGRAMMABLE LOGIC DEVICES Logic families- Propagation Delay, Fan - In and Fan - Out - Noise Margin - RTL, TTL, ECL, CMOS - Comparison of Logic families - Implementation of combinational logic/sequential logic design using standard ICs, PROM, PLA and PAL, basic memory, static ROM, PROM, EPROM, EEPROM EAPROM.	**6**
Total Hours	**30**
PRACTICAL EXERCISES **Total Hours**	**30**

1. Verification of basic Logic gates
2. Design of adders and subtractors
3. Design of Multiplexers & Demultiplexers.
4. Design of Encoders and Decoders.
5. Design of Magnitude Comparators

6. Design and implementation of counters using flip-flops	
Textbooks	
1	M. Morris Mano and Michael D. Ciletti, 'Digital Design', Pearson, 5th Edition, 2013.(Unit I - IV)
Reference(s)	
1	Charles H. Roth, Jr, 'Fundamentals of Logic Design', Jaico Books, 4th Edition, 2002.
2	William I. Fletcher, "An Engineering Approach to Digital Design", Prentice- Hall of India, 1980.
3	Floyd T.L., "Digital Fundamentals", Charles E. Merril publishing company,1982.
4	John. F. Wakerly, "Digital Design Principles and Practices", Pearson Education, 4th Edition,2007.

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

Course Outcome		Level
CO1	**Apply Boolean algebra and simplification techniques to solve logical expressions**	**K3**
CO2	**Design and implement combinational digital circuits using logic gates**	**K5**
CO3	**Analyze and construct synchronous sequential circuits.**	**K4**
CO4	**Analyze and design asynchronous sequential circuits. .**	**K4**
CO5	**Demonstrate understanding of logic families and programmable logic devices for circuit implementation**	**K2**

Mapping with Program Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	2	-	2	-	-	-	3	3	3	3
2	-	-	-	-	-	-	-	-	-	2	1	2	3
3	-	3	3	2	-	2	-	-	-	2	2	3	3
4	-	-	-	-	-	-	-	-	-	3	2	2	3
5	-	3	3	3	-	-	-	-	-	2	2	3	3
3 – Strong, 2 – Medium, 1 - Low													

EC24305– ENERGY STORAGE TECHNIQUES								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	3	0	0	60	3	60	40	100

Course Objective

- Classifications of storage Technologies by Energy.
- Energy storage systems in Modern Electrical Systems.
- Design of batteries in software and Hardware Development.
- Current and future trends in energy storage systems.

UNIT I - ENERGY STORAGE TECHNOLOGIES Classification of Storage Technologies by Energy type- Thermal Energy: Heat Storage; Chemical Energy: Organic and Non- Organic; Mechanical Energy: Kinetic and Potential Energy; Electrical Energy: Electrical Potential.	**6**
UNIT II - ENERGY STORAGE SYSTEMS IN MODERN ELECTRICAL SYSTEMS Lead-acid battery, Nickel-cadmium battery, Lithium-ion battery, Sodium-sulfur battery, Nickel metal hydride battery, Fuel cells, Capacitors and Super capacitors. Solid state Batteries. Differences amongst different ESS.	**6**
UNIT III - DEVELOPMENT CYCLE OF BATTERIES ESS sizing, Electrical, Mechanical and Thermal Design, BMS Software and Hardware development, Prototype development, System Validation, Lab Testing, Safety test and Certification.	**6**
UNIT IV - BATTERY MANAGEMENT SYSTEMS Introduction to BMS, Objectives of the BMS: Discharging control, Charging control, State-of-Charge Determination, State-of-Health Determination, Cell Balancing; BMS topologies: Distributed Topology, Modular Topology and Centralized Topology, Firmware development, Certification, Aging.	**6**
UNIT V - BATTERIES FOR THE EV APPLICATION Batteries for the EV application: Performance criterion for EV batteries- Energy density, Amp hour density, Energy efficiency, Cost, Operating temperature, number of life cycles, recharge and self-discharge rates and commercial availability, some reference batteries and extension to non-automotive sectors	**6**

Textbooks

1	Alfred Rufer, “Energy Storage systems and components”, CRC Press ,2017
2	Tom Denton, “Automotive Electrical and Electronic Systems”, 5th Edition, Routledge ,2018
3	Mehard Ehsani, Yiming Gao, Stefano longo and Kambiz Ebrahimi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles”, CRC Press, 3rd Edition. 2019

Reference(s)

1	Iqbal Husain, “Electric and Hybrid Vehicles: Design Fundamentals”, CRC Press. 2021
2	K. T. Chau, “Energy Systems for Electric and Hybrid Vehicles,” IET Transportation Series 2 ,2016.
3	Jiuchun Jiang and Caiping Zhang, “Fundamentals and Applications of Lithium–Ion Batteries in Electric Drive Vehicles,” John Wiley & Sons ,2015

4	E. Karden, S. Ploumen, B. Fricke, T. Miller and K. Snyder, "Energy storage devices for future hybrid electric vehicles," J. Power Sources, vol. 168, no. 1, pp. 2–11, 2007

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

Course Outcome		Level
CO1	**Distinguish various Energy Storage Technologies**	**K2**
CO2	**Identify Energy Storage Systems in Modern Electrical Systems**	**K2**
CO3	**Analyze the characteristics and development cycle of Batteries**	**K4**
CO4	**Apply different topology of Energy Management Systems in real time**	**K3**
CO5	**Analyze the performance criterion of EV batteries**	**K4**

Mapping with Program Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**-**	**1**	**-**	**1**	**3**	**2**
CO2	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**-**	**1**	**-**	**1**	**3**	**2**
CO3	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**-**	**1**	**-**	**1**	**3**	**2**
CO4	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**-**	**1**	**-**	**1**	**3**	**2**
CO5	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**-**	**1**	**-**	**1**	**3**	**2**
3 – Strong, 2 – Medium, 1 - Low													

EC24311 – ANALOG ELECTRONICS LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	0	0	3	30	1.5	60	40	100

Course Objective

- Study the characteristic of CE,CB and CC Amplifier
- Learn the frequency response of CS Amplifiers
- Study the Transfer characteristic of differential amplifier
- Perform experiment to obtain the bandwidth of single stage and multistage amplifiers
- Perform SPICE simulation of Electronic Circuits

LIST OF EXPERIMENTS	
1. Halfwave and Fullwave rectifiers with filter and without filters	
2. Frequency Response of CE,CB,CC and CS amplifiers	
3. Darlington Amplifier	
4. Differential Amplifiers-Transfer characteristic, CMRR Measurement	
5. Cascode/Cascade amplifier	
6. Class A and Class B Power Amplifiers	
7. Determination of bandwidth of single stage and multistage amplifiers	

8. Schmitt Trigger	
9. Feedback Amplifiers	
10. Spice Simulation of Common Emitter and Common Source amplifiers	
Total Hours	**30**

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

Course Outcome		Level
CO1	**Design rectifiers, Cascade, cascode and Darlington Amplifier**	**K5**
CO2	**Analyze the Frequency response of BJT Amplifiers**	**K4**
CO3	**Measure Transfer characteristics and CMRR in differential amplifier**	**K2**
CO4	**Analyze feedback and Power amplifiers**	**K4**
CO5	**Simulate FET amplifiers using Spice**	**K5**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**1**	**2**	**2**	**1**
CO2	**3**	**2**	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**1**	**2**	**2**	**1**
CO3	**3**	**2**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**1**	**1**	**2**	**1**
CO4	**3**	**2**	**2**	**2**	**3**	**1**	**-**	**-**	**-**	**1**	**1**	**2**	**1**
CO5	**2**	**2**	**3**	**2**	**3**	**2**	**-**	**-**	**-**	**1**	**1**	**2**	**1**
3 – Strong, 2 – Medium, 1 - Low													

EC24312 – COMMUNICATION SYSTEMS LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	0	0	3	30	1.5	60	40	100

Course Objective

- To study the AM & FM Modulation and Demodulation.
- To learn and realize the effects of sampling and TDM.
- To understand the PCM & Digital Modulation.
- To Simulate Digital Modulation Schemes.
- To Implement Equalization Algorithms and Error Control Coding Schemes

LIST OF EXPERIMENTS:	
1. AM- Modulator and Demodulator	

2. FM - Modulator and Demodulator	
3. Pre-Emphasis and De-Emphasis.	
4. Signal sampling and TDM.	
5. Pulse Code Modulation and Demodulation.	
6. Pulse Amplitude Modulation and Demodulation.	
7. Pulse Position Modulation and Demodulation and Pulse Width Modulation and Demodulation.	
8. Digital Modulation – ASK, PSK, FSK.	
9. Delta Modulation and Demodulation.	
10. Simulation of ASK, FSK, and BPSK Generation and Detection Schemes.	
11. Simulation of DPSK, QPSK and QAM Generation and Detection Schemes.	
12. Simulation of Linear Block and Cyclic Error Control coding Schemes.	
Total Hours	**30**

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

Course Outcome		Level
CO1	**Design AM, FM & Digital Modulators for specific applications.**	**K4**
CO2	**Compute and Analyze the sampling frequency for digital modulation.**	**K4**
CO3	**Simulate & validate the various functional modules of Communication system.**	**K5**
CO4	**Demonstrate knowledge in base band signaling schemes through implementation of digital modulation schemes.**	**K5**
CO5	**Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance in Communication system**	**K3**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**1**	**1**	**-**	**-**
CO2	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**1**	**1**	**-**	**-**
CO3	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**1**	**1**	**-**	**-**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**1**	**1**	**-**	**-**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**1**	**1**	**-**	**-**
3 – Strong, 2 – Medium, 1 - Low													

EC24313 – ENERGY STORAGE TECHNOLOGY LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	0	0	2	30	1	60	40	100

Course Objective

- Study about electrical safety components
- Compute the architecture of Vehicle.
- Design and testing of BLDC motor
- To check the IR values of the battery
- To Monitor the Thermal Management

LIST OF EXPERIMENTS	
1. Vehicle Architecture and Electrical Safety (a) Identify the Components (b) Testing the components (c) Using the Insulation Resistance and Check the resistance of different wire gauge (d) Using a 4-Pin Relay and Simulate the working of the Motor and Charger	
2. Electric Vehicle Motor (a) Identify the components (b) Design a DC Motor Controller (c) Design a BLDC Circuit (d) Test the BLDC Motor (e) Check the controller and assemble the BLDC motor	
3. Battery (a) Find the Voltage and Current value of differential chemistry (b) Identify the weight of each cell (c) Check the IR value of the given battery (d) Using the cell tester 5V 20Ah 8Ch Test your battery under different C rating (e) Create a battery pack for the given specification	
4. BMS and Thermal Management (a) Create a BMS hardware using the circuit diagram for a single cell (b) Create a BMS program to protect the cell from different parameters using adruino	
Total Hours	**45**

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

Course Outcome		Level
CO1	**Examine the students with a comprehensive understanding of EV technologies**	**K2**
CO2	**Identify safety protocols**	**K3**
CO3	**Apply the knowledge of practices for working with these vehicles**	**K3**
CO4	**Understand the fundamental principles of energy storage in EV's**	**K2**
CO5	**Recognize the cell from different parameters using adruino**	**K3**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	1	1	-	-	-	1	-	-	-	3	1
CO2	3	3	1	1	-	-	-	1	-	-	-	3	3
CO3	3	3	1	1	-	-	-	1	-	-	-	3	3
CO4	3	3	1	1	-	-	-	1	-	-	-	2	3
CO5	3	3	1	1	-	-	-	1	-	-	-	2	3
3 – Strong, 2 – Medium, 1 - Low													

SEMESTER IV

EC24401– ELECTROMAGNETIC FIELDS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	2	0	45	4	40	60	100

Course Objective

- Apply vector calculus and coordinate systems to electromagnetic problems.
- Understand the fundamentals of electrostatics and related laws.
- Analyze the principles of magnetostatics and associated phenomena.
- Interpret the coupling between electric and magnetic fields using Maxwell's equations.
- Examine the behavior of electromagnetic wave propagation in dispersive media.

UNIT I –VECTOR CALCULUS Cartesian - Cylindrical and spherical co-ordinate systems - differential lengths –line, surfaces and volumes integrals- Gradient – Divergence - Curl operations - Divergence theorem and Stroke's theorem.	**9**
UNIT II –ELECTROSTATICS Coulomb's law - Electric field Intensity - Electric flux density - Gauss's law and applications - potential difference - Potential gradient - Energy in electric field - Equation of continuity, Electric Boundary conditions	**9**
UNIT III- MAGNETOSTATICS Biot- Savart law and applications , Ampere's circuital law, Magnetic field intensity, Magnetic flux density, Magnetic vector and scalar potential, Magnetic Boundary conditions.	**9**
UNIT IV- MAXWELL'S EQUATIONSAND UNIFORM PLANE WAVE Faraday's law, Displacement current, Maxwell's equations in point and integral form, Wave equation in different medium, Wave Impedance, Skin depth, Poynting theorem.	**9**
UNIT V –WAVE PROPAGATION IN DISPERSIVE MEDIA Normal incidence, Standing Wave, Loss Of Reflection, The reflection of obliquely incident waves, Brewster's Angle, Wave polarization, Linear, elliptical and circular	**9**
Total Hours	**45**

Textbook(s)

1	D.K. Cheng, Field and wave electromagnetics, 2nd ed., Pearson (India), 2002.
2	M.N.O.Sadiku and S.V. Kulkarni, Principles of electromagnetics, 6th ed., Oxford(Asian Edition), 2015.

Reference(s)

1	Edward C. Jordan & Keith G. Balmain, ,Electromagnetic waves and Radiating Systems, Second Edition, Prentice-Hall Electrical Engineering Series, 2012.
2	W.H. Hayt and J.A. Buck, Engineering electromagnetics, 7th ed., McGraw-Hill (India), 2006.
3	B.M. Notaros, Electromagnetics, Pearson: New Jersey, 2011.
4	Constantine A. Balanis, **Advanced Engineering Electromagnetics,** John Wiley & Sons, 2nd Edition

5	Clayton R. Paul, Keith W. Whites, Syed A. Nasar, **Introduction to Electromagnetic Fields**, McGraw Hill, 3rd Edition
6	J.D. Kraus**, Electromagnetics**, McGraw Hill

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

Course Outcome		Level
CO1	**Apply vector calculus and coordinate systems to solve basic electromagnetic problems**	**K3**
CO2	**Analyze electrostatic fields and its laws**	**K4**
CO3	**Analyze magnetostatic fields and their characteristics**	**K4**
CO4	**Interpret Maxwell's equations and understand uniform plane wave concepts**	**K2**
CO5	**Apply wave propagation principles in various dispersive media**	**K3**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**2**	**1**	**1**	**1**	**-**	**2**	**1**	**-**	**-**	**1**	**-**	**1**	**3**
CO2	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**3**
CO3	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**3**
CO4	**2**	**2**	**3**	**2**	**2**	**2**	**1**	**-**	**-**	**1**	**1**	**2**	**1**
CO5	**2**	**2**	**3**	**2**	**2**	**2**	**1**	**-**	**-**	**1**	**1**	**2**	**2**
3 – Strong, 2 – Medium, 1 - Low													

EC24402 – LINEAR INTEGRATED CIRCUITS

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Course Objective

- Understand the fabrication process and characteristics of operational amplifiers.
- Design and analyze op-amp based analog circuits for various applications.
- Study the architecture and applications of voltage regulators and phase-locked loops.
- Analyze and implement data converters using op-amps.
- Explore the role of op-amps in AI sensor systems, focusing on signal conditioning and interfacing.

UNIT I - IC FABRICATION AND CIRCUIT CONFIGURATION FOR IC Manufacturing process of monolithic ICs – Construction of monolithic bipolar transistor – Monolithic diodes – Integrated Resistors – Monolithic Capacitors – Inductors. Differential gain – CMRR, General	**9**

operational amplifier stages – internal circuit diagrams of IC 741 – DC and AC performance characteristics – slew rate operational amplifier.	
UNIT II - APPLICATIONS OF OPERATIONAL AMPLIFIERS Advantages of ICs over discrete components – Open and closed loop configurations- Sign Changer – Scale Changer – Voltage Follower – Adder – Subtractor – Instrumentation amplifier – Integrator – Differentiator – Low–pass, High– pass and Band–pass Butterworth filters, Conditions for oscillations – Sinewave generators - RC Oscillators – LC Oscillators- Comparators – Schmitt trigger – Multivibrators – Precision rectifier – V to I and I to V converters.	**9**
UNIT III - VOLTAGE REGULATORS AND PLL Timer IC 555 –Timer applications - IC Voltage regulators– IC 723 general purpose regulator– Switching Regulators, Monolithic switching regulatorOperation of the basic PLL – Closed loop analysis – Voltage controlled oscillator – Monolithic PLL IC 565 – application of PLL for AM detection – FM detection	**9**
UNIT IV - ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS AND ANALOG MULTIPLIER Analog and Digital Data Conversions – specifications – D/A converter– weighted resistor type, R–2R Ladder type – Voltage Mode and Current Mode – A/D Converters– Flash type -Successive Approximation type – Single Slope, Dual Slope. Analog Multiplier using Emitter Coupled Transistor Pair – Gilbert Multiplier cell - DC-DC converters–Frequency to Voltage and Voltage to Frequency converters –Audio Power amplifier – Video Amplifier	**9**
UNIT V - OPERATIONAL AMPLIFIERS IN AI SYSTEMS Review of Op-Amp fundamentals - Op-Amps in signal conditioning for AI sensors - temperature, IR, accelerometer - Filters for AI: Preprocessing sensor signals - noise reduction, smoothing - Comparators and waveform shaping for digital conversion.	**9**
Total Hours	**45**

Textbook(s)	
1	S.Salivahanan& V.S. KanchanaBhaskaran, “Linear Integrated Circuits”, 2nd Edition,TMH, 2015.
2	Sedra & Smith – Microelectronic Circuits (Chapter: Operational Amplifiers) Ramakant Gayakwad – Op Amps and Linear Integrated Circuits
3	IEEE Paper: “AI-enhanced sensor data conditioning using Op-Amps”

Reference(s)	
1	Ramakant A.Gayakwad, “OP-AMP and Linear ICs”, 4th Edition, Prentice Hall / PearsonEducation, 2015
2	Robert F.Coughlin, Frederick F.Driscoll, “Operational Amplifiers and Linear IntegratedCircuits”, Sixth Edition, PHI, 2001
3	S.Salivahanan& V.S. Kanchana Bhaskaran, “Linear Integrated Circuits”, TMH,2nd Edition, 4th Reprint, 2016.

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

Course Outcome		Level
CO1	**Analyze the characteristics of IC741 and Explain the IC fabrication process**	**K4**
CO2	**Design analog circuits using operational amplifiers for signal processing.**	**K5**
CO3	**Explain the operation of voltage regulators and phase-locked loops.**	**K2**
CO4	**Design and implement A/D and D/A converters using op-amp circuits.**	**K5**

CO5	**Analyze op-amp applications in AI systems for sensor signal conditioning.**	**K4**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**
CO2	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**
CO3	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**
CO4	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**
CO5	**1**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**
3 – Strong, 2 – Medium, 1 - Low													

EC24403 – DIGITAL SIGNAL PROCESSING

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	2	60	4	50	50	100

Course Objective

- Understand DFT, FFT algorithms, and their application to digital signal analysis.
- Design and analyze digital IIR and FIR filters for frequency-selective processing.
- Understand the impact of finite precision and quantization effects on digital systems.
- Learn the principles and applications of multirate signal processing.
- Explore adaptive filters, AI, and IoT techniques in modern communication systems.

UNIT I - DISCRETE FOURIER TRANSFORM Sampling Theorem and Aliasing effect, Discrete Fourier transform (DFT) - properties of DFT - periodicity, symmetry, circular convolution. Linear filtering using DFT. Filtering long data sequences - overlap save and overlap add method. Fast computation of DFT - Radix-2 Decimation-in-time (DIT) Fast Fourier transform (FFT), Decimation-in-frequency (DIF) Fast Fourier transform (FFT).	**6**
UNIT II - INFINITE IMPULSE RESPONSE FILTERS 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) - Approximation of derivatives, Impulse invariance method, Bilinear transformation. Structure of IIR filter - direct form I, direct form II, Cascade, parallel realizations**.**	**6**
UNIT III - FINITE IMPULSE RESPONSE FILTERS 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). FIR filter structures - linear phase structure, direct form realizations.	**6**
UNIT IV -FINITE WORD LENGTH EFFECTS Fixed point and floating-point number representation - ADC - quantization - truncation and rounding - input / output quantization error- coefficient quantization error - product quantization error - overflow error and signal scaling - limit cycle oscillations due to product quantization and summation**.**	**6**

UNIT V - DSP APPLICATIONS Multi-rate signal processing: Decimation and Interpolation, Introduction to Adaptive Filters - Applications of adaptive filtering to equalization-Role of AI in enhancing DSP techniques –AI basedImage Filtering and Enhancement.	**6**
Hours	**30**
LAB SESSIONS / MINI PROJECTS	**30Hours**
1. Linear and circular convolutions. 2. Design of FIRfilters(LPF/HPF/BPF/BSF)and demonstrates the filteringoperation 3. Designof ButterworthandChebyshevIIRfilters(LPF/HPF/BPF/BSF)anddemonstratethefilteringoperations 4. Perform MACoperationusingvariousaddressingmodes 5. Noise cancellation using Denoising Autoencoders 6. Implementing a simple speech recognition model.	
Total Hours	**60**

Textbook(s)	
1	JohnG.ProakisandDimitrisG.Manolakis,DigitalSignalProcessing–Principles, Algorithms and Applications, Fourth Edition, Pearson Education / Prentice Hall, 2007
2	A. V. Oppenheim, R.W. Schafer and J.R. Buck, ―Discrete-Time SignalProcessing", 8thIndian Reprint, Pearson, 2004.
Reference(s)	
1	EmmanuelC.Ifeachor&Barrie.W.Jervis,"DigitalSignalProcessing",SecondEdition, Pearson Education / Prentice Hall, 2002.
2	SanjitK. Mitra, "Digital Signal Processing – A Computer Based Approach", Tata Mc Graw Hill,2007
3	AndreasAntoniou,"DigitalSignalProcessing",TataMcGrawHill,2006.
4	Fadi AI- Turjman, Anand Nayyar, Ajantha Devi, Piyush Kumar Shukla Editors, - "Intelligence of things: AI- IOT Based Critical- Applications and Innovations", 1st ed.2021 edition springer.

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

Course Outcome		Level
CO1	**Analyse digital signals and systems using DFT and FFT techniques.**	**K4**
CO2	**Design and implement IIR filters using analog filter approximations.**	**K5**
CO3	**Design FIR filters using windowing using Fourier methods.**	**K5**
CO4	**Analyse the effects of finite word length on digital filter performance.**	**K4**
CO5	**Apply Multi-rate techniques, adaptive filters, and AI-based DSP in communication systems.**	**K3**

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Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	2	-	-	-	-	1	3	3

CO2	**3**	**3**	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
CO3	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**
CO4	**3**	**3**	**2**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
CO5	**3**	**2**	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
3 – Strong, 2 – Medium, 1 - Low													

EC24404 – CONTROL SYSTEMS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Course Objective

- To introduce the components and their representation of control systems
- To learn various methods for analyzing the time response, frequency response and stability of the systems
- To learn the various approach for the state variable analysis

UNIT I - SYSTEMS COMPONENTS AND THEIR REPRESENTATION Control System: 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	**9**
UNIT II - TIME RESPONSE ANALYSIS Transient response-steady state response-Measures of performance of the standard first order and second order system-steady error constant and system- type number-PID control-Analytical design for PD, PI,PID control systems	**9**
UNIT III - FREQUENCY RESPONSE AND SYSTEM ANALYSIS 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 -Cascade lead compensation-Cascade lag compensation-Cascade lag-lead compensation	**9**
UNIT IV - CONCEPTS OF STABILITY ANALYSIS Concept of stability-Bounded - Input Bounded - Output stability-Routh stability criterion-Relative stability-Root locus concept-Guidelines for sketching root locus-Nyquist stability criterion**.**	**9**
UNIT V - CONTROL SYSTEM ANALYSIS USING STATE VARIABLE METHODS 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- AI in Motion Control and Decision-Making- Autonomous Vehicle Control Systems-design and implement an AI-based control solution.	**9**
Total Hours	**45**

Textbook(s)

1	M.Gopal,"Control System – Principles and Design", Tata McGraw Hill, 4th Edition, 2012.
2	Vasant P & Malarvizhi S,"Autonomous Vehicles Volume 1: Using Machine Intelligence", Wiley. 1st Edition,2023

Reference(s)

1	J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2007.
2	K.Ogata, "Modern Control Engineering", PHI, 5th Edition, 2012.
3	S.K.Bhattacharya, "Control System Engineering", Pearson, 3rd Edition, 2013.
4	Benjamin.C.Kuo, "Automatic Control Systems", Prentice Hall of India, 7th Edition,1995.

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

Course Outcome		Level
CO1	**Compute the transfer function of different physical systems.**	**K2**
CO2	**Analyze the time domain specification and calculate the steady state error.**	**K4**
CO3	**Illustrate the frequency response characteristics of open loop and closed loop systemresponse.**	**K3**
CO4	**Analyze the stability using Routh and root locus techniques.**	**K3**
CO5	**Illustrate the state space model of a physical system and discuss the concepts of AI based control system**	**K3**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**3**	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
CO3	**3**	**2**	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**3**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
CO5	**2**	**2**	**3**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**2**	**2**	**2**
3 – Strong, 2 – Medium, 1 - Low													

EC24405– DATA STRUCTURE AND ALGORITHMS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	2	60	4	50	50	100

Course Objective

- To introduce suitable techniques for solving a problem using basic properties of Data Structures.
- To Analyze the performance of algorithms using asymptotic notations
- To Demonstrate knowledge of basic data structures and legal operations on them
- To Analyze basic graph algorithms, operations and applications through a structured algorithmic approach

UNIT I -INTRODUCTIONTO DATA STRUCTURES AND ALGORITHMS Overview and importance of algorithms and data structures, Stages of algorithm development for solving a problem: Describing the problem, identifying a suitable technique, Design of an	**6**

Algorithm, Proof of Correctness of the Algorithm, Computing the time complexity of the Algorithm.	
UNIT II -ANALYSIS OF ALGORITHMS Asymptotic notations and their significance, Running time of an algorithm, Time-complexity of an algorithm, Performance analysis of an algorithm, Analysis of iterative and recursive algorithms, Master theorem (without proof).	**6**
UNIT III - DATA STRUCTURES Importance of data structures, Arrays, Stacks, Queues, Linked list, Trees, Hashing table, Binary Search Tree, Heaps.	**6**
UNIT IV -ALGORITHM DESIGN PARADIGMS Divide and Conquer, Brute force, Greedy, Recursive Backtracking and Dynamic programming.	**6**
UNIT V - GRAPH ALGORITHM Definitions - Graph Representations - Adjacency matrix- Adjacency List-Traverse Graph: Depth first Traversal-Breadth first Traversal-Shortest Path Algorithms: Dijkstra's Algorithm. Minimum Spanning Tree: Prim's Algorithm- Kruskal's Algorithm.	**6**
Total Hours	**30**
PRACTICAL EXERCISES **Total Hours**	**30**

7. Program to perform various operations such as creation, insertion, deletion, search of node and display on singly linked list.
8. Develop a program to perform linear and binary search.
9. Write a program to perform infix into postfix expression, prefix to postfix expression.
10. Implementation of breadth first search and depth first search techniques.
11. Design a postfix calculator (So 1 3 2 4 * - should calculate 1 - (3 * (2 4)).) using stack.
12. Design a Palindrome Checker using Dequeue.

1	Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, Introduction to Algorithms, 2009, Third edition, MIT Press

Reference(s)

1	Sanjoy Dasgupta, C.Papadimitriou and U.Vazirani, Algorithms, 2008, Tata McGraw-Hill.
2	A. V. Aho, J.E. Hopcroft and J. D. Ullman, Data Strucures and Algorithms, 2002, Pearson India, 1st Edition.
3	A. V. Aho, J.E. Hopcroft and J. D. Ullman, The Design and Analysis of Computer Algorithms, 2006, 1st edition, Pearson
4	Sara Baase, Allen Van Gelder, Computer Algorithms, Introduction to Design and Analysis, 1999, 3rd edition, Wesley Longman Publishing.

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

Course Outcome		Level
CO1	**Apply suitable data structures to solve real time problems.**	**K3**
CO2	**Analyze algorithm efficiency using asymptotic notations.**	**K4**
CO3	**Demonstrate operations on linear and non-linear data structures.**	**K2**
CO4	**Evaluate algorithmic strategies and their trade-offs.**	**K5**
CO5	**Analyze graph algorithms and their applications using structured techniques.**	**K4**

Mapping with Program Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	3	2	-	-	-	-	1	2	1
2	3	2	2	3	2	1	-	-	-	-	1	2	1
3	3	2	3	2	2	2	-	-	-	-	1	2	1
4	3	2	2	2	3	1	-	-	-	-	1	2	1
5	2	2	3	2	3	2	-	-	-	-	1	2	1
3 – Strong, 2 – Medium, 1 - Low													

EC24406 – MICROPROCESSOR AND MICROCONTROLLERS

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Course Objective

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

UNIT I - 8086 MICROPROCESSOR Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation**.**	**9**
UNIT II - 8086 SYSTEM BUS STRUCTURE 8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations– Introduction to advanced processors**.**	**9**
UNIT III - I/O INTERFACING Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display ,LCD display, Keyboard display interface and Alarm Controller.	**9**
UNIT IV -MICROCONTROLLER AND INTERFACING Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits – Instruction set - Addressing modes - Assembly language programming- Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of	**9**

Microprocessor, Microcontroller, PIC and ARM processors	
UNIT V - MICROCONTROLLER USING IOT Role of microprocessors in Edge AI and Gateway Devices- ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors- Deployment and troubleshooting in field conditions	**9**
Total Hours	**45**

Textbook(s)	
1	Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007.
2	Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller andEmbedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011.
Reference(s)	
1	Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware",TMH,2012
2	A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3rd edition, TataMcGrawHill, 2012

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

Course Outcome		Level
CO1	**Understand the architecture and instruction set of 8086 Microprocessor**	**K2**
CO2	**Compare various System Bus Structure for 8086 Multiprocessor Configuration**	**K2**
CO3	**Analyze programming and interfacing of Microcontroller**	**K4**
CO4	**Understand the architectures and instruction set of 8051 Microcontroller**	**K2**
CO5	**Design Microcontroller using IOT**	**K5**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
3 – Strong, 2 – Medium, 1 - Low													

EC24411-SOFT SKILL- VERBAL & REASONING								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	3	0	-	-	-

Course Objective

- To help the students understand interpersonal skills.
- To support them in building interpersonal skills.
- To better the ability to work with others.
- To expose students to right attitudinal and behavioral aspects
- To build the right attitudinal through activities

UNIT I COMMUNICATION SKILLS Overview to communication, self-Introduction, Presentation on their own topic, Extempore, Group Activity (Verbal Reasoning - Proposition)	**09**
UNIT II GROUP DISCUSSION Group Discussion, Do's and Don'ts of Group Discussion, Body language, Grooming and Resume, Resume correction, Activity (Verbal Reasoning - Premise)	**09**
UNIT III INTERVIEW SKILLS Introduction to HRM - Questions - Do's and Don'ts - Interview - Mock GD - Stress Management, Activity (Verbal Reasoning - Syllogism)	**09**
UNIT IV PERSONALITY DEVELOPMENT Personality Development - Presentation skills, Interpersonal skills, Critical thinking, Confidence building and Stress management, Activity (Verbal Reasoning - Verbal Analogies)	**09**
UNIT V VERBAL REASONING Vocabulary basics, Grammar basics, Critical Reasoning, Reading comprehension, Logical Reasoning, Analytical puzzles	**09**
Total Hours	**45**

Textbook(s)

1	Barun K Mitra Personality Development and Soft Skills Oxford University Press-New Delhi 2012
2	Rajiv K Mishra Personality Development Rupa & Co 2012.

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

Course Outcome		Level
CO1	Ability to communicate smartly and effectively with co-workers, relationship enhancement.	K2
CO2	Determine the time management and organizational skill.	K3
CO3	Acquire theknowledge about the interview skills.	K3
CO4	Demonstrate the skills to develop the Personality, Critical thinking	K3
CO5	Elaborate the concepts of Critical reasoning and Logical reasoning	K2

EC24412 – LINEAR INTEGRATED CIRCUITS LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	0	0	3	30	2	60	40	100

Course Objective

- To gain hands on experience in designing electronic circuits
- To learn simulation software used in circuit design
- To learn the fundamental principles of amplifier circuits
- To differentiate feedback amplifiers and oscillators.
- To differentiate the operation of various multivibrators

LIST OF EXPERIMENTS:	
DESIGN AND ANALYSIS OF THE FOLLOWING CIRCUITS	
1 Implementation of Inverting, Noninverting, differential amplifiers and voltage follower.	
2 Implementation of Integrator and Differentiator.	
3 Implementation of Schmitt trigger and Instrumentation amplifier.	
4 Design of Active low pass, high pass, band pass and notch filters.	
5 Implementation of Phase shift and Wien bridge oscillators.	
6 Astable and mono stable multivibrators using NE555 Timer.	
7 Analyze PLL 565 characteristics and its use as Frequency Multiplier.	
8 Analyze of DC power supply using LM317, LM723 and Low Drop out (LDO) Regulator using TPS72.	
9 Design of DC to DC converter that can give regulated output voltage for a given input voltage range using TPS40020 IC.	
10 Designing with 12 bit parallel input multiplying DAC 7821	
11 Simulation of Experiments 4, 5, 6, 7 and 8 using Spice tools.	
12 Mini Project	
Components and Accessories:	
Transistors, Resistors, Capacitors, Inductors, diodes, Zener Diodes, Bread Boards, Transformers. SPICE Circuit Simulation Software: (any public domain or commercial software) **Note**: Op-Amps uA741, LM 301, LM311, LM 324, LM317, LM723, 7805, 7812, 2N3524, 2N3525,2N3391, AD 633, LM 555, LM 565 may be used	
Total Hours	**30**

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

Course Outcome		Level
CO1	**Analyze various types of feedback amplifiers**	**K3**
CO2	**Design oscillators, tuned amplifiers, wave-shaping circuits and**	**K4**

	multivibrators	
CO3	**Design and simulate feedback amplifiers,oscillators, tuned amplifiers, wave-shapingcircuits and multivibrators, filters using SPICE Tool**	**K4**
CO4	**Design amplifiers, oscillators, D-A converters using operational amplifiers**	**K4**
CO5	**Design filters using op-amp and perform an experiment on frequency response**	**K4**

Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	3	3	3	-	-	-	-	-	-	1	-	-
CO2	2	3	3	3	-	-	-	-	-	-	1	-	-
CO3	2	3	3	3	-	-	-	-	-	-	1	-	-
CO4	2	3	3	3	2	-	-	-	-	-	1	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-
3 – Strong, 2 – Medium, 1 - Low													