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

DEPARTMENT OF MECHANICAL ENGINEERING

REGULATIONS-2024

B.E – MECHANICAL ENGINEERING

CHOICE BASED CREDIT SYSTEM (CBCS)

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

REGULATIONS – 2024
DEPARTMENT OF MECHANICAL 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	MC24001	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.	PH24004	Physics of Materials	BS	3	0	0	3	3
4.	EE24003	Basics of Electrical & Electronics Engineering	ES	3	0	0	3	3
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.	MC24002	Environmental Science and Sustainability	MN	3	0	0	3	0

PRACTICALS								
8.	EE24004	Basics of Electrical & Electronics Engineering 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	ME24301	Engineering Thermodynamics	PC	4	3	1	0	4
2	ME24302	Manufacturing Processes	PC	3	3	0	0	3
3	ME24303	Kinematics of Machinery	PC	3	3	0	0	3
4	ME24304	Engineering Mechanics	PC	4	3	1	0	4
5	MA24307	Transforms and Statistics	BS	5	3	0	2	4
PRACTICALS								
6	ME24311	Manufacturing Technology Laboratory I	PC	4	0	0	2	2
7	ME24312	Computer Aided Machine Drawing Laboratory	PC	4	1	0	3	2
8	ME24313	Professional Development	EEC	2	0	0	2	1
TOTAL				**29**	**16**	**2**	**9**	**23**

SEMESTER-IV

S. No	Course Code	Course Title	Category	L	T	P	Contact Hours	C
THEORY								
1	ME24401	Engineering Materials and Metallurgy	PC	3	3	0	0	3
2	ME24402	Machine Tools	PC	3	3	0	0	3
3	ME24403	Strength of Materials	PC	3	3	0	0	3
4	ME24421	Fluid Mechanics and Machinery	PC	3	1	2	0	4
5	ME24422	Thermal Engineering	PC	3	1	2	0	4
PRACTICALS								
6	ME24411	Strength of Materials Laboratory	PC	4	0	0	4	2
7	ME24412	Manufacturing Technology Laboratory II	PC	4	0	0	4	2

8	ME24413	Soft Skills	EEC	2	0	0	2	1
			TOTAL	**29**	**15**	**0**	**14**	**22**

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 **Grammar** Preposition, Question Tags, Yes or No questions, Articles **Vocabulary** One word Substitution	**9**
UNIT V - Technical Usage of Language	**9**

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	
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 **9**

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.

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	0	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.

CONCEPTS 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 – 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.	K4
CO4	Draw the projection of sectioned solids and draw the development of surfaces of simple solids.	K4
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. ஒயிலாட்டம் 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	**3**

பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம், கையெழுத்துப்படிகள்.	
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															

MC24001 – 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	**9**

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.	
UNIT IV – OVERVIEW OF 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.	K3
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.	K2
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 – PHYSICS AND CHEMISTRY LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	C		C	CIAT	ESE	Total
I	0	0	4	**4**	2	60	40	100

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 error.
- 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.	K4

CO2	Use graphical models to analyze laboratory data.	K4
CO3	Use mathematical models as a medium for quantitative reasoning and describing physical reality.	K3
CO4	Access, process and analyze scientific information.	K1
CO5	Solve problems individually and collaboratively	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															

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.

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	**6**
UNIT II - Narrative Skill Development **Listening -** Watching travel documentary **Speaking -** Narrating a story -Narrating a personal incident **Reading -** Reading Travelogues, Blogs	**6**
UNIT III - Enriching Speaking Skills **Listening -**Dialogues & Conversations **Speaking -**Group Conversation, Speaking on given topics and context **Reading -** Reading Newspaper Articles, Reading user manuals	**6**
UNIT IV - Language Enhancement **Listening -** Listening to TED Talks,	**6**

Speaking - Speaking about friends/places/hobbies, Delivering Welcome Address **Reading -** Reading Biography, Reading Editorial.	
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	**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															

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:	**30**
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 :	**30**
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															

II SEMESTER

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

To enable the students to:

- 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. **Speakin**g – mechanics of presentations **Reading** – reading for detailed comprehension **Writing** - email etiquette - job application – cover letter – Resume preparation (digital and	**9**

paper based) – analytical essays and issue based essays Vocabulary Development - finding suitable synonyms-paraphrasing **Language Development** - clauses- if conditionals.	
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	**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															

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 EIGENVALUE 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 derivates 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	Apply the concept of testing of hypothesis for small and large samples in real life problems.	K3
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.	K2
CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	K3
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	K1
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	K4

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															

PH24004– PHYSICS FOR MATERIALS								
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 Objectives

- To make the students effectively understand the nature of crystalline materials.
- To impart knowledge on electrical properties of conducting materials.
- To introduce the concepts of semiconductor physics and device applications.
- To understand the importance of magnetic materials and super conductors.
- To inculcate an idea of significance of nano devices.

UNIT I - CRYSTALLINE MATERIALS Introduction to Crystal structures - BCC, FCC and HCP - directions and planes - linear and planar densities - crystal imperfections - edge and screw dislocations - grain and twin boundaries - Burgers vector and elastic strain energy - Slip systems, plastic deformation of materials.	**9**
UNIT II - CONDUCTING AND MAGNETIC MATERIALS Classical free electron theory - Expression for electrical conductivity and thermal conductivity- Wiedemann - franz law - Quantum free electron theory: degenerate states - Density of energy states -Energy bands in solids(Qualitative) Magnetic materials :Dia, para and ferromagnetic effects – para magnetism in the conduction electrons in metals – exchange interaction and ferromagnetism – quantum interference devices – GMR devices.	**9**
UNIT III - SEMICONDUCTING MATERIALS AND DEVICES Classification of semiconductor -Intrinsic semiconductor -Carrier concentration in an intrinsic semiconductor - Extrinsic semiconductors - Carrier concentration in n-type and p-type semiconductors - Carrier transport in Semiconductors: Drift, mobility and diffusion - Hall effect and Devices.	**9**
UNIT IV - OPTICAL PROPRTIES OF MATERIALS Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption– Optoelectronic devices: light detectors and solar cells – light emitting diode - optical processes in organic semiconductor devices - OLED.	**9**
UNIT V - NANO MATERIALS Quantum confinement – Quantum structures – quantum wells, wires and dots – Zener-Bloch oscillations – Resonant tunneling – quantum interference effects – Semiconductor photonic structures – 1D, 2D and 3D photonic crystal. Active and passive optoelectronic devices – photo processes – carbon nanotubes: Properties and applications.	**9**
Total Hours	**45**

Textbook(s)

1	Raghavan, V "Materials Science and Engineering: A First Course, Prentice Hall India Learning

	Private Limited, 2015.
2	S.O. Kasap, Principles of Electronic Materials and Devices, Mc-Graw Hill, 2018.
Reference(s)	
1	James F. Shackelford, "Introduction to Materials Science for Engineers", 8th edition, 8th edition, Pearson, 2015.
2	Donald R Askeland, Wedelin J Wright, "Essentials of Materials Science and Engineering", Cengage Learning India Private Ltd., 2018.
3	Balasubramaniam, R. "Callister's Materials Science and Engineering". Wiley India Pvt. Ltd., 2014,

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

Course Outcome		**Level**
CO1	Express their knowledge in understanding crystalline structures	K2
CO2	Gain knowledge on classical and quantum electron theories and energy band structures	K1
CO3	Acquire knowledge on basics of semiconductor physics and its applications	K1
CO4	Gain knowledge about magnetic materials and super conductors.	K1
CO5	Demonstrate a strong foundational knowledge in understanding nano materials	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**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**2**	**1**	**1**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**3**	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**2**	**2**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO5	**3**	**2**	**2**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
3 – Strong, 2 – Medium, 1 – Low															

EE24003 -BASIC ELECTRICAL AND 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 introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- To introduce the functional elements and working of measuring instruments

UNIT 1 ELECTRICAL CIRCUITS DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state).Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only).	**9**
UNIT II ELECTRICAL MACHINES Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.	**9**
UNIT III ANALOG ELECTRONICS Semiconductor Materials: Silicon & Germanium – PN Junction Diodes, Zener Diode – Characteristics Applications -MOSFET, I-V Characteristics and Applications, Operational amplifier and its applications.IC-555 timer, A stable multi vibrator.	**9**
UNIT IV DIGITAL ELECTRONICS Review of number systems, binary codes, error detection and correction codes, representation of logic functions-SOP and POS forms, adder and subtractor - minimization using K maps (Simple Problems only), Combinational logic circuits.	**9**
UNIT V - MEASUREMENTS AND INSTRUMENTATION Functional Functional elements of an instrument, Standards and calibration, Operating Principle, types -Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT, DSO- Block diagram- Data acquisition system..	**9**
Total Hours	**45**

Textbook(s)

1	Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020
2	S.K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.
3	Sedha R.S., "A text book book of Applied Electronics", S. Chand & Co., 2008
4	James A. Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.

Reference(s)	
1	Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
2	Thomas L. Floyd, 'Digital Fundamentals', 11thEdition, Pearson Education, 2017.
3	Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7thedition, 2017.
4	Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
5	H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010
6	Muthusubramaniam R, Salivahanan S, "Basic Electrical and Electronics Engineering", Tata Mc Graw Hill P ublishers, 2018

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

Course Outcome- After completing this course, the students will be able to		**Level**
CO1	Compute the electric circuit parameters for simple problems	K2
CO2	Explain the working principle and applications of electrical machines	K2
CO3	Analyze the characteristics of analog electronic devices	K1
CO4	Explain the basic concepts of digital electronics	K2
CO5	Explain the operating principles of measuring instruments	K3

Mapping with Program Outcomes

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

- 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

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)- Thirumalai Nayakar 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 Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.	**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	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)
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	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	K1
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 பன்முகத் தன்மையை 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 பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.	**3**
அலகு V - அறிவியல் தமிழ் மற்றும் கணித்தமிழ்: அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம்	**3**

தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.	
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	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
3	National The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: Interl Institute of Tamil Studies)

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	K1
CO3	தமிழ் மக்களின் நாட்டுப்புற மற்றும் தற்காப்பு கலைகள் பற்றிய ஆய்வு.	K2
CO4	திணை கருத்துக்கள், வர்த்தகம் மற்றும் சோழ வம்சத்தின் வெற்றி.	K3
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															

MC24002 – 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 OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasizeon 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 nonrenewableresources, 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 mega diversity 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 ofsustainability - 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 solutions - case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry - A case study.	**6**
UNIT V SUSTAINABILITY PRACTICES Zero waste and R concept, Circular economy, Material Life cycle assessment,	**6**

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.	
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 andtheir conservation.	K1
CO2	To identify the causes, effects of environmental pollution and natural disasters and contributeto the preventive measures in the society.	K2
CO3	To identify and apply the understanding of renewable and non-renewable resources andcontribute 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

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															

EE24004-BASIC ELECTRICAL AND ELECTRONICS ENGINEERING 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

- To train the students in conducting load tests on electrical machines
- To gain practical experience in characterizing electronic devices
- To train the students to use DSO for measurements

LIST OF EXPERIMENTS

1. Verification of ohms and Kirchhoff's Laws.
2. Load test on DC Shunt Motor.
3. Load test on Self Excited DC Generator
4. Load test on Single phase Transformer
5. Load Test on Induction Motor
6. Static VI Characteristics of PN and Zener Diodes
7. Characteristics of MOSFET input and output
8. Half wave and Full Wave rectifiers
9. Study of Logic Gates
10. Implementation of Binary Adder and Subtractor
11. Study of DSO
12. Study of starters, isolator, miniature circuit breaker

Total Hours	**60**

Reference(s)

1	Thomas L. Floyd, 'Digital Fundamentals', 11th Edition, Pearson Education, 2017
2	Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, Mc Graw Hill Education, 2019.

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

Course Outcome- After completing this course, the students will be able to		**Level**
CO1	Use experimental methods to verify the Ohm's and Kirchhoff's Laws.	K2
CO2	Analyze experimentally the load characteristics of electrical machines	K1
CO3	Analyze the characteristics of basic electronic devices	K1
CO4	Able to design different rectifiers, develop and construct.	K2

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

III SEMESTER

ME24301– ENGINEERING THERMODYNAMICS								
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 enable students to understand the Laws of thermodynamics.
- To enable students to understand the thermodynamic cycles
- To enable students to understand the concept of entropy, enthalpy over thermodynamic cycles.
- To enable students to understand the AI integration of thermodynamic application.

UNIT I - FIRST LAW OF THERMODYNAMICS : Introduction, system, properties, zeroth law of thermodynamics and application, thermodynamic state and equilibrium, process and cycle, work, heat and other forms of energy; First law of thermodynamics, application to open and closed systems, general energy equation and applications.	**12**
UNIT II - SECOND LAW OF THERMODYNAMICS : Kelvin-Planck and Clausius statements, heat engines and heat pump, reversibility, Carnot cycle, Carnot theorem, thermodynamic temperature scale; Third law of thermodynamics, types of irreversibility; first and second law efficiencies.	**12**
UNIT III - PROPERTIES OF PURE SUBSTANCES : Ideal gas properties, equations of state, properties of mixtures, compressibility, pure substances, P-V-T surfaces, phase change processes, vapor pressure, properties of steam, use of property tables, T-S diagrams, Mollier chart, Rankine cycle.	**12**
UNIT IV - ENTROPY : Clausius theorem, property of entropy, Clausius inequality, entropy and its applications, microscopic interpretation of entropy, maximum work obtainable from finite heat reservoirs, entropy generation in open and closed systems, isentropic work in a steady flow open system.	**12**
UNIT V –THERMODYNAMICS RELATIONSHIP: Principle of ideal and real gases, Vander Waal's relation-Compressibility factor, Maxwell relation- Clausius -Clapeyron equation and Joule-Thomson experiment. Modern AI tools for optimization and prediction of thermodynamic relation and its dependant factors.	**12**
Total Hours	**60**

Textbook(s)

1	Sonntag R E, Borgnakke C, Van Wylen G.J , "Fundamentals of Engineering Thermodynamics", 9th Edition, JohnWiley & Sons, USA, 2017.
2	Nag P K , "Engineering Thermodynamics", 6th Edition, Tata McGraw Hill, India, 2017.

Reference(s)

1	Yunus A Cengel, Boles M A , "Thermodynamics: An Engineering Approach", 8th Edition, Tata McGraw Hill, USA, 2017.
2	Michael Moran J, Howard Shapiro N, Daisie Boettner D, Margaret Bailey D , "Fundamentals of Engineering Thermodynamics", 8th Edition, John Wiley & Sons, USA, 2014.
3	Onkar Singh , "Engineering Thermodynamics", 1st Edition, New Age International, India, 2007.
4	Holman J P , "Thermodynamics", 3rd Edition, Tata McGraw Hill, USA, 2003.

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

Course Outcome		Level
CO1	Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems.	K3
CO2	Apply the second law of thermodynamics in analysing the performance of thermal devices through energy and entropy calculations.	K3
CO3	Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart	K3
CO4	Apply the knowledge of mathematics, science and engineering fundamentals and comprehend the concept and applications of energy, entropy and exergy	K3
CO5	To understand the AI assist in automated scientific discovery by leveraging data and physical principles, including symmetries and conservation laws, to study complex phenomena.	K3

Mapping with Program Outcomes

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

ME24302–MANUFACTURING PROCESSES								
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 familiarize the students with fundamental processes of manufacturing.
- To impart knowledge on various conventional and modern manufacturing tools and techniques.

UNIT I –CASTING AND METAL JOINING PROCESSES Casting: Sand Casting – Sand Mould – Type of patterns - Pattern Materials – Pattern allowances –Cores - Melting furnaces – Types of casting methods -remedies. Welding: Fusion welding processes – Filler and Flux materials-Arc welding, Electrodes, Coating and specifications – Types of welding - Weld defects – inspection &remedies – Brazing - soldering – Adhesive bonding.	**9**
UNIT II - MANUFACTURING OF CYLINDRICAL & NON-CYLINDRICAL SHAPES Lathe - lathe operations - turning parameters - attachments - problems in machining time calculation. Boring and Boring machines, drilling machines - drills - description of drill bits, reamers, tapping tool, Milling - types, operations, material removal rate and machining time - calculations for milling process, Planning, Shaping, Broaching -description, operations and types, problem machining time & Material removal rate.	9

UNIT III –MANUFACTURING OF GEARS, THREADS, SHEET METAL & POWDER METALLURGY Generation of forms, difference between forming generation, thread chasing, die-heads, thread rolling, thread milling, thread grinding, gear planning, gear hobbing, gear shaping - straight bevel and spiral bevel gear manufacture. Sheet metal forming methods: Shearing, Blanking, Bending, Stretch Forming, deep forming - High Velocity Forming. Powder Metallurgy: Methods of producing powder. Pressing, sintering, sizing-Advantages and limitations.	9
UNIT IV - MANUFACTURING OF PLASTICS, CERAMICS AND RUBBER Polymers - structures, thermoplastics, moulding and machining of thermoplastics, extrusion process, sheet forming process, thermos setting plastics, moulding and machining thermo setting plastics, other processing methods for plastics, plastic component design –Mould design, processing of rubber.	9
UNIT V –MODERN MANUFACTURING PROCESSES Recent trends in manufacturing technology – Additive manufacturing – 3D printing - Machine Learning – Deep Learning – Neuro Linguistic Programming – Robotics – Automation – Digital twins – M2M communication – Sensors and Actuators - Smart manufacturing - Industrial Internet of Things (IIOT) - AI integrated manufacturing processes - Industry 5.0.	9
Total Hours	**45**

Textbook(s)	
1	Kalpakjian. S, "Manufacturing Engineering and Technology", Pearson Education India,7th Edition, 2018.
2	P.N.Rao Manufacturing Technology Volume 1 & 2, McGraw Hill Education, 5th edition,2018.
Reference(s)	
1	Roy. A. Lindberg, Processes and materials of manufacture, PHI / Pearson education, 2006.
2	S. Gowri P. Hariharan, A.Suresh Babu, Manufacturing Technology I, Pearson Education, 2008.
3	Paul Degarma E, Black J.T and Ronald A. Kosher, Eligth Edition, Materials and Processes in Manufacturing, Eight Edition, Prentice – Hall of India, 1997.
4	Hajra Chouldhary S.K and Hajra Choudhury. AK., Elements of workshop Technology, volume I and II, Media promoters and Publishers Private Limited, Mumbai, 1997.
5	Sharma, P.C., A Text book of production Technology, S.Chand and Co. Ltd., 2004
6	Dr. Rajkumar, Dr. VG. Sridhar, "Introduction to smart manufacturing and Automation", Namya Press, 2024.

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

Course Outcome		Level
CO1	Apply the principles of different metal casting and joining processes.	K3
CO2	Make use of various metal fabrication using lathe add milling operations	K3
CO3	Utilize various techniques in the production or gears, threads, sheet metals and powder metallurgy.	K3
CO4	Experiment with various technology for fabrication of plastics, ceramics and rubber	K3

CO5	Apply recent technologies in manufacturing using advanced computer and AI technologies.	K3

Mapping with Program Outcomes

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

ME24303 – KINEMATICS OF MACHINERY								
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 impart students with the knowledge about the basics of Mechanisms and understand the geometry of motion at any point in a link of a mechanism.
- To facilitate students to understand the types of cam and follower, motion and profile drawing of cam.
- To give awareness to students on the phenomenon of direction of rotation and speed determination for simple, compound and planetary gear systems.
- To enable students to understand the effects of friction in motion transmission and in machine components.

UNIT I - BASICS OF MECHANISMS Classification of mechanisms — Basic kinematic concepts and definitions — Degree of freedom, Mobility — Kutzbach criterion, Grubler's criterion — Grashof's Law — Kinematic inversions of four-bar chain and slider crank chains — Limit positions — Mechanical advantage — Transmission Angle — Description of some common mechanisms — Quick return mechanisms, Straight line generators, Universal Joint — rocker mechanisms - Role of AI in Automated Kinematic Analysis.	**9**
UNIT II - KINEMATICS OF LINKAGE MECHANISMS Displacement, velocity and acceleration analysis of simple mechanisms — Graphical method– Velocity and acceleration polygons — Velocity analysis using instantaneous centres — kinematic analysis of simple mechanisms — Coincident points — Coriolis component of Acceleration — Introduction to linkage synthesis problem - Application of AI in Velocity and Acceleration Prediction in Mechanisms.	**9**
UNIT III - KINEMATICS OF CAM MECHANISMS Classification of cams and followers — Terminology and definitions — Displacement diagrams –Uniform velocity, parabolic, simple harmonic and cycloidal motions — Derivatives of follower motions — Layout of plate cam profiles — Specified contour cams — Circular arc and tangent cams — Pressure angle and undercutting — sizing of cams - AI-Driven Analysis	**9**

in Cam-Follower Systems.	
UNIT IV - GEARS AND GEAR TRAINS Law of toothed gearing — Involutes and cycloidal tooth profiles –Spur Gear terminology and definitions –Gear tooth action — contact ratio — Interference and undercutting. Helical, Bevel, Worm, Rack and Pinion gears [Basics only]. Gear trains — Speed ratio, train value — Parallel axis gear trains — Epicyclic Gear Trains - Role of AI in Gear Train Optimization	**9**
UNIT V - FRICTION IN MACHINE ELEMENTS Surface contacts — Sliding and Rolling friction — Friction drives — Friction in screw threads — Bearings and lubrication — Friction clutches — Belt and rope drives – Role of AI in friction elements.	**9**
Total Hours	**45**

Textbook(s)	
1	Rattan, S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill, 2009.
2	Dr.R.K.Bansal and Dr.J. S. Brar, "A Text book of Theory of Machines", Laxmi publications, 2011
Reference(s)	
1	Ambekar A.G., "Mechanisms and Machine Theory", Prentice Hall of India, New Delhi, 2007
2	Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", 3rd Edition, Oxford University Press, 2009

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

Course Outcome		**Level**
CO1	Define the basic terminologies of kinematics	K1
CO2	Demonstrate and apply the principles of kinematics	K2
CO3	Analyse and determine the parameters involved in the various kinematic elements	K3
CO4	Discover the effects of friction in mechanical element	K2
CO5	Calculate the Position, velocity and acceleration of simple planar mechanisms	K3

Mapping with Program Outcomes

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

ME24304 – ENGINEERING MECHANICS

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 Learn the use scalar and vector analytical techniques for analyzing forces in statically determinate structures
- To introduce the equilibrium of rigid bodies, vector methods and free body diagram
- To study and understand the distributed forces, surface, loading on beam and intensity.
- To learn the principles of friction, forces and to determine the apply the concepts of frictional forces at the contact surfaces of various engineering systems.
- To develop basic dynamics concepts – force, momentum, work and energy

UNIT I – STATICS OF PARTICLES Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Introduction - Laws of Mechanics, Parallelogram and triangular Laws of forces – Coplanar Forces - Resolution and Composition of forces – Free body diagram - Equilibrium of a particle– Lami's theorem – Equilibrium of a particle in space - Strain gauges.	**12**
UNIT II - EQUILIBRIUM OF RIGID BODIES Principle of transmissibility – Moment of force about a point – Varignon's theorem – Moment of a couple – Equivalent couple – Moment of force about an axis – Coplanar non-concurrent forces acting on rigid bodies – Resultant and equilibrium – Resolution of a given force into force couple system – Equilibrium in three dimensions –Load Analysis Reactions and supports.	**12**
UNIT III - CENTROIDS AND MOMENT OF INERTIA Centre of gravity, Centre of mass and Centroid – Moment of Inertia of simple and complex areas – Transfer formula – Radius of gyration – Polar moment of inertia – Product of inertia - Mass moment of Inertia of simple solids.	**12**
UNIT IV - FRICTION . Laws of friction – coefficient of friction – Dry friction – wedge friction – ladder friction – AI for tribology: Present and future.	**12**
UNIT V - DYNAMICS OF PARTICLES Kinematics – Rectilinear and curvilinear motion – projectile motion. Kinetics – Newton's law – D'Alembert's Principle – Work Energy method –Principle of Impulse and Momentum, Impact of bodies. Application of artificial intelligence & Machine learning technique for dynamic analysis.	**12**
Total Hours	**60**

Textbook(s)

1	Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 12thEdition, 2019.

2	Vela Murali, “Engineering Mechanics-Statics and Dynamics”, Oxford University Press, 2018.
Reference(s)	
1	Timoshenko S, Young D H, Rao J V and SukumarPati, Engineering Mechanics, 5thEdition, McGraw Hill Higher Education, 2013.
2	Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.
3	Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.
4	Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.

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

Course Outcome		Level
CO1	Apply the fundamental concepts in determining the effect of forces on a particle.	K2
CO2	Analyze the rigid body in equilibrium	K3
CO3	Evaluate the properties of distributed forces	K3
CO4	Determine the friction and the effects by the laws of friction	K3
CO5	Calculate dynamic forces exerted in rigid body	K3

Mapping with Program Outcomes

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

MA24307 – TRANSFORMS AND STATISTICS								
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 Objectives

- To introduce Fourier series analysis, which is fundamental to various engineering applications beyond its traditional role in solving boundary value problems.
- To acquaint the student with Fourier Transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.
- To acquaint knowledge of testing of hypothesis for small and large samples plays an important role in real life problems

- To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

UNIT I FOURIER SERIES Periodic functions-Dirichlet's Conditions-General Fourier Series-Odd and even functions-Half range sine series-Half range cosine series- Complex form of Fourier series-Parseval's Identity-Harmonic analysis.	**12**
UNITIIFOURIER 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 III 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**
UNIT IV TESTING OF HYPOTHESIS Sampling distributions –Test for single mean, proportion and difference of means (Large and small samples) – Test for single variance and equality of variances - Chi-square test for goodness of fit – Independence of attributes.	**12**
UNIT V STATISTICAL QUALITY CONTROL Control charts for measurements (¯and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.	**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.
3	Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata Mc Graw Hill, 4th Edition, 2007.

Reference(s)

1	Andrews. L.C and Shivamoggi. B, "Integral Transforms for Engineers" SPIE Press, 1999.
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	James. G., "Advanced Modern Engineering Mathematics", 4thEdition, Pearson Education, New Delhi, 2016.
5	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

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

Course Outcomes		Level
CO1	To understand the use of periodic signals and Fourier series in the analysis of electrical circuits and systems.	K3

CO2	To apply Fourier transform techniques as a tool for solving integral equations.	K4
CO3	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.	K3
CO4	Apply the concept of testing of hypothesis for small and large samples in real life problems	K3
CO5	Have the notion of sampling distributions and statistical techniques used in engineering and management problems.	K4

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															

ME24311 – MANUFACTURING TECHNOLOGY LABORATORY - I								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	0	0	4	60	2	60	40	100

Course Objective

- Ability to select appropriate machines and tools to fabricate a job of desired dimensions and tolerance.
- Ability to perform basic manufacturing processes like turning and welding.

1. Simple and step turning	**60**
2. Facing operation	
3. Step Turning	
4. Taper Turning	
5. External Thread Cutting	
6. Internal Thread Cutting	
7. Knurling	
8. Square Head Shaping	
9. Hexagonal Head Shaping	
10. Fabrication of simple structural shapes using Gas Metal Arc Welding	
Total Hours	**60**

Reference(s)

1	Munusami V, "Manufacturing Technology I Laboratory", Royal Book Publishing(Partner of Eleyon Publishers), 2022.

2	Veerana D.K. "Workshop / Manufacturing Practices(with Lab Manual)", KhannaPublishing House, 2022.

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

Course Outcome		Level
CO1	Select appropriate machines and tools for fabrication of desired form and dimensions	K1
CO2	Demonstrate usage of lathe for various forming operations	K2
CO3	Utilize various tools to fabricate intricate contours, threads and welds	K3
CO4	Analyze the requirements and perform operations to produce gears and special components	K4
CO5	Estimate the parameters in the machininge to achieve the required design.	K4

Mapping with Program Outcomes

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

ME24312 – COMPUTER AIDED MACHINE DRAWING LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
VI	0	0	4	60	2	60	40	100

Course Objective

- To acquaint the skills and practical experience in handling 2D drafting and 3D modelling software
- To prepare assembly drawings both manually and using standard CAD packages.
- To Preparing standard drawing layout for modeled parts, assemblies with BoM.

PART I DRAWING STANDARDS & FITS AND TOLERANCES Code of practice for Engineering Drawing, BIS specifications – Welding symbols, riveted joints, keys,fasteners – Reference to hand book for the selection of standard components like bolts, nuts, screws, keysetc. - Limits, Fits – Tolerancing of individual dimensions IS919- Specification of Fits – Preparation ofproduction drawings and reading of part and assembly drawings, basic principles of Geometric Dimensioning&Tolerancing.	**12**
PART II 2D DRAFTING Drawing, Editing, Dimensioning, Layering, Hatching, Block, Array, Detailing, Detailed Drawing. 1. Bearings – Bush Bearing, 2. Valves – Safety and Non-return Valves. 3. Couplings – Flange, Oldham's, Muff, Gear couplings. 4. Joints – Universal, Knuckle, Gib& Cotter, Strap, Sleeve &Cotter joints.	**48**

5. Engine parts – Piston, Connecting Rod, Crosshead (vertical and horizontal), Stuffing box, multi-plate clutch. 6. Machine Components – Screw Jack, Machine Vice, LatheTail Stock, Lathe Chuck, Plummer Block,Vaneand Gear pumps. Total: 20% of classes for theory classes and 80% of classes for practice Note: 25% of assembly drawings must be done manually and remaining 75% of assembly drawings must be done by using any CAD software. The above tasks can be performed manually and using standard commercial 2D CAD software.	
Total Hours	**60**

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

	Course Outcome	Level
CO1	Acquaint the skills and practical experience in handling 2D drafting and 3D modelling software	K4
CO2	Prepare assembly drawings both manually and using standard CAD packages	K4
CO3	Prepare standard drawing layout for modeled parts, assemblies with BoM.	K4

Mapping with Program Outcomes

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

ME24313 –PROFESSIONAL DEVELOPMENT								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
III	0	0	2	60	1	60	40	100

Course Objective

- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.
- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered
- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

MS WORD: Create and format a document Working with tables Working with Bullets and Lists Working with styles, shapes, smart art, charts Inserting objects, charts and importing objects from other office tools	**10**

Creating and Using document templates Inserting equations, symbols and special characters Working with Table of contents and References, citations Insert and review comments Create bookmarks, hyperlinks, endnotes footnote Viewing document in different modes Working with document protection and security Inspect document for accessibility	
MS EXCEL: Create worksheets, insert and format data Work with different types of data: text, currency, date, numeric etc. Split, validate, consolidate, Convert data Sort and filter data Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.,) Work with Lookup and reference formulae Create and Work with different types of charts Use pivot tables to summarize and analyse data Perform data analysis using own formulae and functions Combine data from multiple worksheets using own formulae and built-in functions to generate results Export data and sheets to other file formats Working with macros Protecting data and Securing the workbook	**10**
MS POWERPOINT: Select slide templates, layout and themes Formatting slide content and using bullets and numbering Insert and format images, smart art, tables, charts Using Slide master, notes and handout master Working with animation and transitions Organize and Group slides Import or create and use media objects: audio, video, animation Perform slideshow recording and Record narration and create presentable videos	**10**
Total Hours	**30**

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

	Course Outcome	Level
CO1	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements	K3
CO2	Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding	K3
CO3	Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.	K3

Mapping with Program Outcomes

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

SEMESTER - IV

ME24401-ENGINEERING MATERIALS AND METALLURGY								
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 learn the constructing the phase diagram and using of iron-iron carbide phase diagram for microstructure formation.
- To learn selecting and applying various heat treatment processes and its microstructure formation.
- To illustrate the different types of ferrous and non-ferrous alloys and their uses in engineering field
- To illustrate the different polymer, ceramics and composites and their uses in engineering field.
- To learn the various testing procedures and failure mechanism in engineering field.

UNIT I - CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron – Iron carbide equilibrium diagram. Classification of steel and cast-Iron microstructure, properties and application. Modelling and Simulation in Metallurgy: Using computational tools to model and simulate metallurgical processes. Sensor Network to collect cooling curve data for phase transformation tracking	**9**
UNIT II - HEAT TREATMENT Definition – Full annealing, stress relief, recrystallisation and spheroidising –normalizing, hardening and tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram – continuous cooling Transformation (CCT) diagram – Austempering, Martempering – Hardenability, Jominy end quench test -case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening – Vacuum and Plasma hardening – Thermo-mechanical treatments- elementary ideas on sintering. AI/ML in Materials Engineering: Applying artificial intelligence and machine learning techniques to analyze material data, predict material behavior, and design new materials. Smart heat treatment chambers that control and collect temperature real time data.	9
UNIT III - FERROUS AND NON-FERROUS METALS Effect of alloying additions on steel (Mn, Si, Cr, Mo, Ni, V,Ti& W) – stainless and tool steels – HSLA - Maraging steels – Grey, white, malleable, spheroidal – alloy cast irons, Copper and its alloys – Brass, Bronze and Cupronickel – Aluminium and its alloys; Al-Cu – precipitation strengthening treatment – Titanium alloys, Mg-alloys, Ni-based super alloys – shape memory alloys- Properties and Applicationverview of materials standards Materials Informatics: Using data analytics to understand and predict material behavior at the atomic level. Embeded micro sensor alloy samples to track and control temperature profile using IOT sensor.	9
UNIT IV - NON-METALLIC MATERIALS Polymers – types of polymers, commodity and engineering polymers – Properties and	9

applications of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PAI, PPO, PPS, PEEK, PTFE, Thermoset polymers – Urea and Phenol formaldehydes –Nylon, Engineering Ceramics – Properties and applications of Al2O3, SiC, Si3N4, PSZ and SIALON – intermetallics- Composites- Matrix and reinforcement Materials- applications of Composites - Nano composites Smart Materials: Exploring materials with self-sensing and self-healing capabilities.	
UNIT V - MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS Mechanisms of plastic deformation, slip and twinning – Types of fracture – fracture mechanics- Griffith's theory- Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), Micro and nano-hardness tests, Impact test lzod and charpy, fatigue and creep failure mechanisms.	9
Total Hours	**45**

Textbook(s)	
1	Kenneth G.Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 9th edition ,2018.
2	Sydney H.Avner, "Introduction to Physical Metallurgy", McGraw Hill Book Company, 1994
Reference(s)	
1	A. Alavudeen, N. Venkateshwaran, and J. T.WinowlinJappes, A Textbook of Engineering Materials and Metallurgy, Laxmi Publications, 2006.
2	Amandeep Singh Wadhwa, andHarvinder Singh Dhaliwal, A Textbook of Engineering Material and Metallurgy, University Sciences Press, 2008.
3	G.S. Upadhyay and Anish Upadhyay, "Materials Science and Engineering", Viva Books Pvt.Ltd, New Delhi, 2020.
4	Raghavan.V, "Materials Science and Engineering", Prentice Hall of India Pvt.Ltd. 6th edition, 2019.
5	Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, 2nd edition Re print 2019.

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

	Course Outcome	Level
CO1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.	K2
CO2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes	K2
CO3	Clarify the effect of alloying elements on ferrous and non-ferrous metals.	K2
CO4	Summarize the properties and applications of non-metallic materials.	K2
CO5	Explain the testing of mechanical properties.	K2

Mapping with Program Outcomes

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

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

ME24402-MACHINE TOOLS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
IV	3	0	0	45	3	40	60	100

Course Objective

- To introduce to demonstrate the fundamentals of machining processes and machine tools.
- To develop knowledge and importance of metal cutting and machine tools.
- To understand the Knowledge in Tools of drilling and Boring operations.
- To develop the concept of Tooling in Milling and Grinding.
- To Analyze the concept of AI in Machine tooling.

UNIT I –MACHINE TOOL INTROUCTION Elementary treatment of metal cutting theory - Elements of cutting process - Geometry of single point tool and angles, chip formation and types of chips - built up edge and its effects, chip breakers. Mechanics of orthogonal cutting -Merchant's Force diagram, cutting forces - cutting speeds, feed, depth of cut, heat generation, tool life, machinability. cutting Tool materials and cutting fluids -types and characteristics.	**9**
UNIT II – TOOLS IN LATHE Engine lathe - Principle of working- specification of lathe - types of lathes - work holders and tool holders -Taper turning, thread turning and attachments for Lathes. Turret and capstan lathes - collet chucks - other work holders - tool holding devices - box. Principle features of automatic lathes - classification - Single spindle and multi-spindle automatic lathes.	**9**
UNIT III –TOOLS IN DRILLING AND BORING Drilling and Boring Machines - Principles of working, specifications, types, operations performed - tool holding devices - twist drill - Boring tools - machining time calculation. Shaping, Slotting and Planning machines -Principles of working - Principle parts - specification, classification, Operations performed. Machining time calculations	**9**
UNIT IV –MILLING TOOLS Milling Machine - Principles of working - specifications - classifications of milling machines - Principal features - machining operations, Types and geometry of milling cutters- methods of Indexing. Ball milling -Operation and its types.	**9**
UNIT V –GRINDING TOOLS Grinding Machine -Theory of grinding - classification- cylindrical and surface grinding machine - Tool and cutter grinding machine - special types of grinding machines - Grinding wheel: Different types of abrasives - bonds, specification and selection of a grinding wheel. Static and dynamic balancing of a wheel Truing and Dressing of wheels. Lapping, Honing and Broaching machines.	**9**
Total Hours	**45**

Textbook(s)	
1	Manufacturing Technology :Metal Cutting and Machine Tools,P.N.Rao.3e(vol.2),Tata McGraw-Hill Education.
2	Production Technology by R.K. Jain and S.C.Gupta,Khanna Publishers,17th edition,2012.
Reference(s)	
1	Manufacturing Technology-Kalpakzian-Pearson.(2013)
2	Metal Cutting Principals by Milton C.Shaw.,oxford Second edition,2012.
3	Production Technology by H.M.T,(Hindustan Machine Tools),TMH,1 edition,2011.
4	Production Technology by K.L.Narayana,IK International Pub.(2018)
5	Unconventional Machining Process by V.K.Jain,Allied Pub,2016.
6	Machining and machine Tools by AB.Chattopadyay,WileyEdn,2013.

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

Course Outcome		Level
CO1	Apply the basic concepts of tools in the manufacturing industry.	K3
CO2	Describe the operational features of centre lathe and other special purpose lathes.	K4
CO3	Analyze the operational features of drilling and boring machine.	K4
CO4	Implement the concept of Milling machine in industry.	K3
CO5	Execute the concept of Grinding machine and its tools in component production.	K3

Mapping with Program Outcomes

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

ME24403 - STRENGTH OF MATERIALS							
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**	
	L	**T**	**P**		**C**	**CIAT**	**ESE**	**Total**
IV	3	0	0	45	3	40	60	100

Course Objective

- To familiarize the students with stress and strain in normal and oblique planes.
- To understand the behaviour of beams under transverse loading.
- To design shafts and springs for required load conditions.
- To estimate beam deflection and slope of bending under loading.
- To design thin cylinders and spheres and thick cylinders for given parameters.

UNIT I –STRESSES IN RIGID AND DEFORMABLE BODIES Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses: Tensile, Compressive and Shear – Deformation of simple, compound and composite bars under axial	**9**

load –Thermal stress – Elastic constants – Strain energy – Principal planes and Principal stresses.	
UNIT II – TRANSVERSE LOADING OF BEAMS Beams – Types - Transverse loading on beams – Shear force and Bending moment in beams – Cantilever, Simply supported and over hanging beams. Theory of simple bending – Bending stressdistribution – Load carrying capacity – Shear stressdistribution.	9
UNIT III –TORSION AND SPRINGS Theory of Torsion – Stresses and Deformations in Solid and Hollow Circular Shafts – Combined bending moment and torsion of shafts - Power transmitted to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs.	9
UNIT IV –DEFELECTION OF BEAMS Elastic curve – Governing differential equation - Double integration method - Macaulay's method – Areamoment method - Conjugate beam method for computation of slope and deflection of determinantbeams.	9
UNIT V –THIN CYLINDERS AND SPHERES AND THICK CYLINDERS Stresses in thin cylindrical shell due to internal pressure - circumferential and longitudinal stresses -Deformation in thin cylinders – Spherical shells subjected to internal pressure – Deformation in sphericalshells – Thick cylinders - Lame's theory.	9
Total Hours	**45**

Textbook(s)	
1	S. S. Rattan, "Strength of Materials", Tata McGraw Hill Education, Second Edition, 2011.
2	Bansal R K, "Strength of Materials', Laxmi Publications, New Delhi, 7th edition, 2024.
Reference(s)	
1	Beer. F.P. & Johnston. E.R. "Mechanics of Materials", Tata McGraw Hill, 8th Edition, New Delhi 2019.
2	Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., New Delhi, 2015.
3	Rajput R. K., "Strength of Materials", S. Chand & Co., Ltd., 2011.
4	Sadhu Singh, "Strength of Materials", Khanna publishers, New Delhi, 2013
5	Popov E P, Balan T A, "Engineering mechanics of solids", Pierson Education, 2010.

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

	Course Outcome	Level
CO1	Analyze deformable bodies for stresses and strains.	K4
CO2	Examine the shear forces and bending moments in transverse loading of beams.	K5
CO3	Asses the various design parameters for shafts and springs.	K5
CO4	Evaluate the deflection and slopes for beams using various methods.	K5
CO5	Examine the bilateral stresses in thin and thick cylinders and spherical shells.	K4

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

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

ME23432 - FLUID MECHANICS AND MACHINERY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
IV	3	0	2	60	4	50	50	100

Course Objective

1. Introduce about properties of the fluids and the behaviour of fluids under static and dynamic conditions applied to their applications.
2. Understand the difference between laminar and turbulent flow through circular conduits and losses in pipeflow.
3. Gain knowledge of dimensional and model analysis.
4. Understand the performance calculations of turbines with their velocity triangle.
5. Understand the performance calculations of pumps and their application.

UNIT I – FLUID PROPERTIES AND FLOW CHARACTERISTICS Properties of fluids- Pressure Measurements-Buoyancy and floatation-Flow characteristics-Eulerian and Lagrangian Principle of fluid flow–the concept of control volume and system-continuity equation, energy equation, and Momentum equation-Applications.	10
UNIT II - FLOW THROUGHPIPES AND BOUNDARY LAYER Laminar flow through circular conduits- Darcy Weisbach equation – friction factor- Moody diagram- minor losses- Hydraulic and energy gradient (theory)–Pipes in series and parallel Boundary layer concepts–types of boundary Layer thickness.	10
UNIT III – DIMENSIONAL ANALYSIS AND MODEL STUDIES Fundamental dimensions- Dimensional homogeneity-Rayleighs method and Buckingham Pitheorem- Dimensionless parameters- Similitude and model studies- Distorted and undistorted models.	8
UNIT IV – TURBINES Introduction about Impact of jets-Theory of roto-dynamic machines-Classification of turbines–Pelton wheel, Francis turbine (inward and outward),and Kaplan turbine -Working principles-Work done by water on the runner- Efficiencies –Draft tube- Specific speed-Performance curves for turbines– Governing of turbines	9
UNIT V – PUMPS Classification of pumps- Centrifugal pumps– working principle - Heads and efficiencies–Velocity triangles- Work done by the impeller-performance curves- Reciprocating pump–indicator diagram and its variations (theory)–air Vessels (concept basis).	8
Total Hours	**50**

List of Experiments **Total Contact Hours : 30**

1. Determination of the Coefficient of discharge of the given Orifice meter.

2. Determination of the Coefficient of discharge of the given Venturi meter.	
3. Calculation the rate of flow using the Rotameter.	
4. Determination of friction factor for a given set of pipes.	
5. Conducting experiments and drawing the characteristic curves of the centrifugal pump.	
6. Conducting experiments and drawing the characteristic curves of the reciprocating/Gear pump.	
7. Conducting experiments and drawing the characteristic curves of the Gear pump.	
8. Conducting experiments and drawing the characteristic curves of the Pelton wheel.	
9. Conducting experiments and drawing the characteristics curves of the Francis/Kaplan turbine.	
Textbook(s)	
1	ModiP.N. and Seth,S.M. Hydraulics and Fluid Mechanics, Standard Book House, New Delhi,(2017).
2	YunusA. Cengel; JohnM .Cimbala, Fluid Mechanics, Mc Graw Hill Education Pvt.Ltd.,2014.
Reference(s)	
1	R K Bansal, Fluid mechanics and Hydraulic machines, Laxmi Publications Pvt Ltd, Ninth Edition2012.
2	SK Som; Gautam Biswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, Tata McGrawHillEducationPvt.Ltd.,2012.
3	Subramanya,K. Fluid Mechanics and Hydraulic Machines, Tata Mc Graw-Hill Pub.Co., New Delhi,2011.
4	JainA.K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, NewDelhi,2014.
5	Streeter,V.L. and WylieE.B. Fluid Mechanics, Mc Graw Hill Publishing Co. (2010).

Lab equipment required:

S.No	Name of the Equipment	Quantity Required
1	Orifice meter.	1
2	Venturi meter.	1
3	Rota meter.	1
4	Set of pipes.	1
5	Centrifugal pump.	1
6	Reciprocating pump.	1
7	Gear pump.	1
8	Pelton wheel.	1
9	Francis turbine.	1
10	Kaplan turbine.	1

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

Course Outcome		Level
CO1	Distinguish the difference between solid and fluid and its properties and behaviour in static &dynamic conditions.	K3

CO2	Estimate losses in pipe lines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel.	K3
CO3	Formulate the relationship among the parameters involved in the given fluid phenomenon and predict the Performances of prototypes by model studies.	K3
CO4	Analyze the performance of turbines and their characteristics.	K4
CO5	Analyze the performance of pumps and their characteristics.	K4

Mapping with Program Outcomes

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

ME23433 - THERMAL ENGINEERING								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
IV	3	0	2	60	4	50	50	100

Course Objective

1. To integrate the laws and concepts of thermodynamics into the analysis of gas power cycles
2. To analyses the working of internal combustion engines and its auxiliary systems
3. To understand the working and performance of the steam nozzles and steam turbines
4. To understand the working of air compressors and to evaluate their performance
5. To analyses various refrigeration cycles and air conditioning systems

(Use of standard refrigerant property data book, Steam Tables, Mollier diagram and Psychrometric chart are permitted)

UNIT I – GAS POWER CYCLES Otto, Diesel, Dual, Brayton cycles, Calculation of mean effective pressure, and air standard efficiency- Comparison of cycles.	9
UNIT II – INTERNAL COMBUSTION ENGINES Classification - Components and their function. Valve timing diagram and port timing diagram - actual and theoretical p-V diagram of four stroke and two stroke engines. Carburettor. MPFI, Diesel pump and injector system. Battery and Magneto Ignition System- Principles of Combustion and knocking in SI and CI Engines. Lubrication and Cooling systems. Performance of IC Engines (Description only).	9
UNIT III – STEAM NOZZLES AND TURBINES Flow of steam through nozzles, shapes of nozzles, effect of friction, critical pressure ratio, super saturated flow. Impulse and Reaction principles, compounding, velocity diagram for simple and multi-stage turbines, speed regulations –Governors.	9

UNIT IV – AIR COMPRESSOR Classification and working principle of various types of compressors, work of compression with and without clearance, Volumetric efficiency, Isothermal efficiency and Isentropic efficiency of reciprocating compressors, Working of multistage air compressor (Description only).	9
UNIT V – REFRIGERATION AND AIR CONDITIONING Refrigerants-Vapour compression refrigeration cycle-superheat, subcooling– Performance calculations- working principle of vapour absorption system, Ammonia –Water, Lithium bromide – water systems (Description only). Air conditioning system - Processes, Types and Working Principles.	9
Total Hours	**45**

List of Experiments	**Total Contact Hours:30**
1.Valve Timing and Port Timing diagrams	
2.Determination of Flash Point and Fire Point of various fuels/ lubricants	
3.Determination of Viscosity– Red Wood Viscometer	
4.Performance and Heat Balance Teston 4–strokes low/high speed single cylinder Diesel Engine	
5.Performance and Heat Balance Teston 4–stroke twin cylinder Diesel Engine	
6.Performance test for 2-stroke/4-stroke SI engine.	
7.Measurement of Exhaust Emissions of IC engine.	
8.Demonstration of p-v plots using a computerized IC engine test rig.	
9.Retardation Test on a Diesel Engine	
10. Study on Steam Generators and Turbines	

Textbook(s)	
1	Rajput.R.K.,"ThermalEngineering",10thEdition,LaxmiPublications,2018
2	Ballaney.P.L.,"ThermalEngineering",25thEdition,KhannaPublishers,2017.

Reference(s)	
1	Mahesh.M.Rathore,"ThermalEngineering",1stEdition,TataMcGrawHill,2010.
2	Kothandaraman.C.P.,Domkundwar.S,Domkundwar.A.V.,"AcourseinthermalEngineering",Fifth Edition, Dhanpat Rai & sons, 2004
3	GanesanV.."InternalCombustionEngines",ThirdEdition,TataMcgraw-Hill2007
4	Rudramoorthy,R,"ThermalEngineering",TataMcGraw-Hill,NewDelhi,2003

Lab equipment required:

S.No	Name of the Equipment	Quantity Required
1	I.C Engine–2 stroke and 4 stroke model.	1
2	Red Wood Viscometer.	1
3	Apparatus for Flash and Fire Point	1
4	4-stroke Diesel Engine with mechanical loading.	1
5	4-stroke Diesel Engine with electrical loading	1
6	4–stroke twin cylinder Diesel Engine	1
7	Steam Boiler with turbine setup.	1

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

Course Outcome		Level
CO1	Integrate the laws and concepts of thermodynamics into the analysis of gas power cycles	K3
CO2	Analyze the working of internal combustion engines and its auxiliary systems	K3
CO3	Understand the working and performance of the steam nozzles and steam turbines	K3
CO4	Understand the working of air compressors and to evaluate their performance	K4
CO5	Analyze various refrigeration cycles and air conditioning systems	K4

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

ME24411 – STRENGTH OF MATERIALS LABORATORY								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
IV	0	0	4	60	2	60	40	100

Course Objective

- To study the mechanical properties of metals, wood and spring by testing in laboratory.
- To verify the principles studied in fluid mechanics and machinery theory by performing experiments in laboratory.

1. Evaluation of Engineering stress and strain curve on mild steel under tension load.	**60**
2. Evaluate the hardness values of steel, copper, aluminium using Rockwell and Brinell hardness testing machine	
3. Torsion test on circular shaft –compute the shear stress and modulus of rigidity	
4. Double shear test of mild steel rod	
5. Compute the bending stress and young modulus of simply supported beam	
6. Estimation of notch impact energy using Charpy and Izod Impact Testing Machines.	
7. Tests on springs-compression-load deformation characteristics, stiffness, shear stress, modulus of rigidity, energy	
8. Strain measurement using Rosette Strain Gauge.	
9. Effect of hardening- Improvement in hardness and impact resistance of steels.	

	10. Tempering- Improvement Mechanical properties Comparison (i) Unhardened specimen (ii) Quenched Specimen and (iii) Quenched and tempered specimen	
	Total Hours	**60**

Reference(s)

1	Bansal, R.K., "Strength of Materials", Laxmi Publications (P) Ltd., VI Edition.
2	Kumar D S, "Strength of Materials (Mechanics of solids)", Kataria S K and Sons, New Delhi, III Edition.
3	Ferdinand P. Been, Russell Johnson, J.r. and John J. Dewole "Mechanics of Materials", Tata McGraw Hill Publishing ‘co. Ltd., New Delhi, Low Price Edition, 2007.
4	Gere, James M, "Mechanics of Materials", Cengage Learning, 2018, IX Edition.

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

Course Outcome		Level
CO1	To assess the behaviour of materials different load conditions.	K5
CO2	Estimate and interpret the effect of heat treatment on different materials	K5
CO3	Measure the deflection of beams at different load conditions.	K5
CO4	Evaluate the spring properties under compression load	K5
CO5	Characterize the microstructure of given samples	K5

Mapping with Program Outcomes

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

ME24412 – MANUFACTURING TECHNOLOGY LABORATORY - II								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
IV	0	0	4	60	2	60	40	100

Course Objective

- To Study and acquire knowledge on various basic machining operations in special purpose machines and its applications in real life manufacture of components in the industry.

1	Contour Milling using Vertical Milling Machine	60
2	Spur gear cutting in Milling Machine	
3	Helical Gear Cutting in Milling Machine	

4	Gear generation in Gear Shaping Machine	
5	Plain Surface Grinding	
6	Cylindrical Grinding	
7	External Keyway cutting using Shaping Machine.	
8	Internal Keyway cutting using Slotting Machine.	
9	Measurement of cutting forces in Milling / Turning Process	
10	CNC Part Programming	
	Total Hours	**60**

Reference(s)

1	Roy. A.Lindberg, "Process and Materials of Manufacture," Fourth Edition, PHI/Pearson Education 2006.
2	Richerd R Kibbe, John E. Neely, Roland O. Merges and Warren J.White "Machine ToolPractices", Prentice Hall of India, 1998.
3	HMT, "Production Technology", Tata McGraw Hill, 1998.

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

Course Outcome		Level
CO1	Ability to find right tool for the machining of various contour operations	K1
CO2	Ability to use different machine tools to manufacturing gears	K2
CO3	Use different machine tools for surface finishing operations	K3
CO4	Demonstrate the knowledge on force measurement using dynamometer	K4
CO5	Develop CNC part programming	K4

Mapping with Program Outcomes

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

ME24413 – SOFT SKILLS								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CIAT	ESE	Total
IV	0	0	2	30	1	100	40	100

Course Objective

- You may have an elaborate set of hard skills such as coding, design, web development, editing, or management abilities as an employee. But hard skills are considered technical knowledge in a particular field and are insufficient to sustain in the workplace.
- You need soft skills to maintain interpersonal relationships with your colleagues and move upward in the hierarchy in your department and the organization.
- The best soft skills include critical thinking ability, problem-solving strategies, creativity, emotional quotient, and attitude toward other employees.

Soft skills 1.Introduction Need for soft skills 2.Personality development • Types of personality • Personality development • Elements of personality development • SWOT analysis • Goal setting • Creativity Human values 3. Communication skills • Introduction • Purpose of communication • Process of communication • Key elements of communication • Characteristics of effective communication • Tools of communication • Verbal communication • Listening skills • Speaking skills • Non-verbal communication • Dealing with conflict Barriers to communication Overcoming barriers 4. Interpersonal relationships Introduction Importance of interpersonal relationship skills • Types of interpersonal relationships • Uses of interpersonal relationship skills • Factors affecting interpersonal relationships • How to accommodate different styles Consequences of interpersonal relationships 5 Basic Grammars • Tenses • Prepositions • Pronunciation • Letter Writing	**10**
Teambuilding • Introduction • Importance of human relations • What is a team • Understanding behaviour • Comfort zones • Stepping stones to assertiveness • Getting to win/win • Assertiveness building blocks • Characteristics of high performance teams • Self-questionnaire 2 Leadership • Introduction • Meaning of leadership • Importance of leadership	**10**

• Leadership relationship • Approaches to leadership • Task, team and individual function 3 Time management • Introduction • How do you manage time? 4 Presentation skills • Introduction • Process • Examples of presentation language 5 Managing stress • Introduction • What is stress • Recognizing stress • Acknowledging stress	
Thinking skills • Introduction • Core thinking skills • Categories of thinking 2 Problem solving • Introduction • Need for problem solving • Skills for problem solving • Process of problem solving • Stages of problem solving • Methods of problem solving 3 Decision making • Introduction • Features • Scope • Purpose 4 Employment communication • Introduction • Writing CV(curriculum vitae) • Interview 5 Workplace etiquette • Introductions • Behaviour at work • Personal etiquette • Using office utilities and resources • Travel etiquette	**10**
Total Hours	**30**

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

Course Outcome		Level
CO1	On completion of this course will be able to communicate easily and develop interpersonal relationship	K3
CO2	On completion of this course will be able to build a team,idea of leadership and time management	K3
CO3	On completion of this course will be able to problem solving and decision making skills	K3

Mapping with Program Outcomes

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