KPR Institute of Engineering and Technology

Learn Beyond

(Autonomous, Affiliated to Anna University)

CURRICULUM AND SYLLABI

REGULATIONS – 2025

Department of

Electrical and Electronics Engineering

CONTROLLED COPY

I. Vision and Mission of the Institute

Vision

To become a premier institute of academic excellence by imparting technical, intellectual and professional skills to students for meeting the diverse needs of industry, society, the nation and the world at large

Mission

- Commitment to offer value-based education and enhancement of practical skills
- Continuous assessment of teaching and learning processes through scholarly activities
- Enriching research and innovation activities in collaboration with industry and institutes of repute
- Ensuring the academic processes to uphold culture, ethics and social responsibilities

II. Vision and Mission of the Department

Vision

To be a premier centre for quality education, innovation and research in the field of Electrical and Electronics Engineering to meet the global challenges with professional ethics and social consciousness

Mission

The mission of the department is to

- Provide a holistic environment to students through knowledge-centric and skill-based education
- Collaborate with industries for effective research and innovation in Electrical Engineering and allied areas
- Enable students to serve the society through prolific ideas with professionalism and ethical values

III. Program Educational Objectives (PEOs)

The Program Educational Objectives (PEOs) of the ELECTRICAL AND ELECTRONICS ENGINEERING (EE) represent major accomplishments that the graduates are expected to achieve after three to five years of graduation.

PEO1: Apply the acquired knowledge and skills to meet the emerging needs of the society and also excel in their chosen profession

PEO2: Adapt to emerging technologies and continuously upskill through active research in Electrical Engineering and allied areas

PEO3: Demonstrate leadership skills and practice their profession conforming to ethical and human values

IV. Program Outcomes (POs)

Graduates of the ELECTRICAL AND ELECTRONICS ENGINEERING will be able to

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions (WK8)

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PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment (WK1, WK5, and WK7)

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/ multi-disciplinary teams

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (WK8)

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes

V. Program Specific Outcomes (PSOs)

Graduates of the ELECTRICAL AND ELECTRONICS ENGINEERING will be able to

PSO1: Analyse, design and test power electronic components integrated with computer-based systems to meet industrial and societal needs

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PSO2: Deploy modern engineering tools to model, simulate, fabricate and integrate electrical systems with renewable energy to enhance sustainability

VI. PEO / PO Mapping

Following three levels of correlation should be used:

1: Low

2: Medium

3: High

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

VII. Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
I	English Proficiency I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Calculus and Differential Equations	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓
	Engineering Physics	✓	✓	✓	✓	-	-	-	-	-	-	-	✓	✓
	Applied Chemistry for Electronics Engineers	✓	✓	✓	✓	-	-	-	✓	✓	-	✓	✓	✓
	Problem Solving using C Programming	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓	-
	Digital Technologies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
	Electrical Engineering Disciplines and Skills	✓	✓	✓	✓	-	✓	✓	✓	✓	-	✓	-	✓
	Chinese for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	French for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Japanese for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Hindi for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	German for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Induction Program - Universal Human Values I	-	-	-	-	-	✓	✓	✓	-	-	✓	-	-
	Heritage of Tamils	-	-	-	-	-	-	✓	✓	-	✓	-	-	-
	Design Thinking	✓	✓	✓	✓	-	-	-	-	✓	✓	✓	✓	-
	Biology for Engineers	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	-	-
	Computer Fundamentals and Coding Essentials	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	✓	-
II	English Proficiency II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Mathematical Transforms	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓
	Physics for Electrical and Electronics Engineering	✓	✓	✓	✓	-	-	-	-	-	-	-	✓	✓
	Environmental Science and Sustainability	✓	✓	✓	✓	-	-	✓	✓	✓	-	✓	✓	✓
	Computational Problem Solving using Python	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓	-

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Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
	Basics of Mechanical Engineering	✓	✓	-	-	✓	✓	-	✓	✓	-	-	-	✓
	Basics of Civil Engineering	✓	✓	✓	-	-	-	-	-	-	-	✓	-	✓
	Electric Circuit Analysis	✓	✓	✓	✓	✓	-	✓	✓	✓	-	✓	-	✓
	Engineering Graphics	✓	✓	-	-	✓	-	✓	✓	✓	-	✓	-	-
	Chinese for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Hindi for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	French for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Japanese for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	German for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Universal Human Values II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Tamils and Technology	-	-	-	-	-	-	✓	✓	-	✓	-	-	-
	Design Thinking	✓	✓	✓	✓	-	-	-	-	✓	✓	✓	✓	-
	Biology for Engineers	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	-	-
	Computer Fundamentals and Coding Essentials	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	✓	-
III	Probability and Statistics	✓	✓	-	-	✓	-	-	-	-	-	-	✓	-
	Electromagnetic Theory and Applications	✓	✓	✓	✓	✓	-	✓	-	-	-	✓	-	✓
	Electrical Machines I	✓	✓	✓	✓	-	-	-	-	-	-	✓	-	✓
	Analog Electronics and Applications	✓	✓	✓	✓	-	-	-	-	-	-	✓	✓	-
	Digital Logic Design	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓	-
	Data Structures and Algorithms	✓	✓	✓	✓	✓	-	-	-	-	-	-	✓	-
	Electrical Machines I Laboratory	✓	✓	✓	✓	✓	-	✓	✓	✓	-	✓	-	✓
	Analog Electronics and Applications Laboratory	✓	✓	✓	✓	✓	-	✓	✓	✓	-	-	✓	-
	Essence of Indian Traditional Knowledge	-	✓	-	✓	-	-	✓	-	-	-	-	-	-
	Professional Skill Development - I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
IV	Numerical Methods and Partial Differential Equations	✓	✓	-	-	-	-	-	-	-	-	-	-	✓
	Electrical Machines II	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	✓
	Power Transmission and Distribution	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	-	✓
	Microprocessors and Microcontrollers	✓	✓	✓	✓	✓	-	-	✓	✓	-	✓	✓	-
	Object Oriented Programming Using Java	✓	✓	✓	✓	-	-	-	-	-	-	✓	✓	-
	Electrical Machines II Laboratory	✓	✓	✓	✓	✓	-	✓	✓	✓	-	✓	-	✓
	Object Oriented Programming Using Java Laboratory	✓	✓	✓	✓	-	-	-	-	-	-	✓	✓	-
	Indian Constitution	-	-	-	-	-	✓	✓	✓	-	-	-	-	-
	Professional Skill Development - II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-

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ELECTRICAL AND ELECTRONICS ENGINEERING

Regulations 2025

For the students admitted from 2025 onwards

CHOICE BASED CREDIT SYSTEM

CURRICULUM FOR I - VIII SEMESTERS

SEMESTER I

No	Course Code	Title	Category	Type	L	T	P	J	C
1	U25ENG01	English Proficiency I	HSMC	L	-	-	2	-	1
2	U25MA101	Calculus and Differential Equations	BSC	TwL	2	-	2	-	3
3	U25PH101	Engineering Physics	BSC	TwL	2	-	2	-	3
4	U25CY102	Applied Chemistry for Electronics Engineers	BSC	TwL	2	-	2	-	3
5	U25CSG01	Problem Solving using C Programming	ESC	TwL	2	-	2	-	3
6	U25CSG03	Digital Technologies	ESC	T	1	-	-	-	1
7	U25EE101	Electrical Engineering Disciplines and Skills	PCC	TwL	1	-	4	-	3
8	U25LEG01 U25LEG02 U25LEG03 U25LEG04 U25LEG09	German for Engineers - I Japanese for Engineers - I French for Engineers - I Hindi for Engineers - I Chinese for Engineers - I	HSMC	TwL	1	-	2	-	2
Total									**19**
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
9	U25MCC01	Induction Program - Universal Human Values I	MCC	MCC	2	1	-	-	3
10	U25MCC02	Heritage of Tamils	MCC	Tamil Courses	1	-	-	-	1
11	U25MCC03 U25MCC04 U25MCC05	Design Thinking Computer Fundamentals and Coding Essentials @ Biology for Engineers $	MCC	MCC	1	-	2	-	2
Total									**6**

$ - For Non-Biology Students, @ - For Biology Students

SEMESTER II

No	Course Code	Title	Category	Type	L	T	P	J	C
1	U25ENG02	English Proficiency II	HSMC	L	-	-	2	-	1
2	U25MA204	Mathematical Transforms	BSC	TwL	2	-	2	-	3
3	U25PH205	Physics for Electrical and Electronics Engineering	BSC	TwP	2	-	-	2	3
4	U25CY201	Environmental Science and Sustainability	BSC	TwL	1	-	2	-	2
5	U25CSG05	Computational Problem Solving using Python	ESC	TwL	2	-	2	-	3
6	U25CEG01 U25MEG02	Basics of Civil Engineering Basics of Mechanical Engineering	ESC	TwL	1	-	2	-	2
7	U25EE201	Electric Circuit Analysis	PCC	TwL	2	-	2	-	3
8	U25MEG03	Engineering Graphics	ESC	L	-	-	4	-	2

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No	Course Code	Title	Category	Type	L	T	P	J	C
9	U25LEG05 U25LEG06 U25LEG07 U25LEG08 U25LEG10	German for Engineers - II Japanese for Engineers - II French for Engineers - II Hindi for Engineers - II Chinese for Engineers - II	HSMC	TwL	1	-	2	-	2
Total									**21**
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
10	U25MCC06	Universal Human Values II	MCC	MCC	2	1	-	-	3
11	U25MCC07	Tamils and Technology	MCC	Tamil Courses	1	-	-	-	1
12	U25MCC03 U25MCC04 U25MCC05	Design Thinking Computer Fundamentals and Coding Essentials @ Biology for Engineers $	MCC	MCC	1	-	2	-	2
Total									**6**

$ - For Non-Biology Students, @ - For Biology Students

SEMESTER III

No	Course Code	Title	Category	Type	L	T	P	J	C
1	U25MA302	Probability and Statistics	BSC	TwL	2	-	2	-	3
2	U25EE301	Electromagnetic Theory and Applications	PCC	T	3	-	-	-	3
3	U25EE302	Electrical Machines I	PCC	T	3	-	-	-	3
4	U25EE303	Analog Electronics and Applications	PCC	T	3	-	-	-	3
5	U25EE304	Digital Logic Design	PCC	TwL	2	-	2	-	3
6	U25ADG02	Data Structures and Algorithms	PCC	TwL	3	-	2	-	4
7	U25EE305	Electrical Machines I Laboratory	PCC	L	-	-	2	-	1
8	U25EE306	Analog Electronics and Applications Laboratory	PCC	LwP	-	-	2	2	2
Total									**22**
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
9	U25MNC02	Essence of Indian Traditional Knowledge	MNC	MNC	1	-	-	-	-
10	U25MCC08	Professional Skill Development - I	MCC	MCC	-	-	-	-	1
Total									**1**

SEMESTER IV

No	Course Code	Title	Category	Type	L	T	P	J	C
1	U25MA403	Numerical Methods and Partial Differential Equations	BSC	T	3	-	-	-	3
2	U25EE401	Electrical Machines II	PCC	T	3	-	-	-	3
3	U25EE402	Power Transmission and Distribution	PCC	T	3	1	-	-	4
4	U25ECG04	Microprocessors and Microcontrollers	PCC	TwL	3	-	2	-	4
5	U25CSG11	Object Oriented Programming Using Java	PCC	T	3	-	-	-	3
6	U25EE403	Electrical Machines II Laboratory	PCC	L	-	-	2	-	1

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No	Course Code	Title	Category	Type	L	T	P	J	C
7	U25CSG13	Object Oriented Programming Using Java Laboratory	PCC	L	-	-	2	-	1
8	-	Open Elective I	OEC	T	1	-	4	-	3
					3	-	-	-	
					2	-	2	-	
Total									**22**
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
9	U25MNC03	Indian Constitution	MNC	MNC	1	-	-	-	-
10	U25MCC09	Professional Skill Development - II	MCC	MCC	-	-	-	-	1
Total									**1**

T - Theory, **L** - Laboratory, **TwL** - Theory with Laboratory, **TwP** - Theory with Project

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SEMESTER I

		Category: HSMC				
		L	T	P	J	C
U25ENG01	English Proficiency I (Common to all programmes)	0	0	2	0	1

COURSE OBJECTIVES:

- Comprehend technical vocabulary
- Apply reading strategies to understand academic and professional texts

COURSE OUTCOMES:

CO 1: Comprehend technical and professional documents using vocabulary and strategies — **Remember**

CO 2: Evaluate the understanding from technical reports and case studies — **Understand**

CO - PO MAPPING:

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

LIST OF EXPERIMENTS

1. Contextual lexicon – Discourse markers – Strategies for reading – Read aloud: stress and intonation – Interpretive Reading and narrative analysis – Critical reading of abstracts and conclusions from research articles / magazines / blogs
2. Newspaper: Opinions, Editorials and Columns – Short Story: The Bet – Anton Chekhov – Science Fiction: Never Let Me Go – Kazuo Ishiguro
3. Reading Standard Operating Procedures (SOPs) – Manuals – Case Studies (Field Work) Evaluation – Sustainability Practices in Industry: A Case Study – Biographies of Popular Engineers and Inventors – Success Stories of Start-ups and Entrepreneurs

CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 30 Periods

TEXTBOOKS:

1. Meenakshi Raman and Sangeeta Sharma, "Technical Communication: Principles and Practice", 3rd Edition, Oxford University Press, 2015
2. Debra Daise and CharlNorloff, "Q Skills for Success: Q: Skills for Success: Reading and Writing, Level 4", 3rd Edition, Oxford University Press, 2019

REFERENCES:

1. Sudharshana N P and Savitha C, "English for Technical Communication", 1st edition, Cambridge University Press, 2016
2. Thomas L. Means, "English and Communication for Colleges", 4th Edition, Cengage India Private Limited, 2017

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SEMESTER I

U25MA101	Calculus and Differential Equations (Common to AD, AM, BM, CB, CS, EC, EE, IT, SC)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To develop a strong foundation in multivariable calculus, vector calculus, and differential equations for application in engineering problems
- To equip students with the skills needed to solve optimization, integration, and differential equations problems relevant to real – world engineering scenarios
- To foster the ability to apply advanced mathematical techniques for analyzing and modeling physical systems in various engineering fields

COURSE OUTCOMES:

CO 1: Understand and apply the concepts of multivariable calculus, including partial derivatives, total derivatives, and the Taylor series for multiple variables, to solve engineering problems **Understand**

CO 2: Solve optimization problems using methods like Lagrange multipliers and find the extrema of multivariable functions **Apply**

CO 3: Compute and interpret double and triple integrals, including change of order and change of variables, and apply them to calculate areas and volumes in engineering contexts **Understand**

CO 4: Apply vector calculus concepts such as gradient, divergence, curl, and directional derivatives to analyze physical systems and engineering problems **Apply**

CO 5: Solve ordinary and partial differential equations, including those with constant and variable coefficients, and apply these solutions to engineering scenarios **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	-	-	-	-	-	-	-	-	-	1	-
CO 2	3	2	-	-	-	-	-	-	-	-	-	1	-
CO 3	2	2	-	-	-	-	-	-	-	-	-	-	1
CO 4	2	2	-	-	-	-	-	-	-	-	-	-	1
CO 5	3	2	-	2	1	-	-	-	-	-	-	-	1

SYLLABUS:

UNIT I: MULTIVARIABLE CALCULUS **6 + 6**

Functions of several variables – Partial derivatives and total derivative – Taylor series for two variables – Extrema of multivariable functions – Lagrange multipliers method

UNIT II: MULTIPLE INTEGRALS AND APPLICATIONS **6 + 6**

Double and triple integrals – Change of order and change of variables – Applications in computing area and volume

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UNIT III: VECTOR CALCULUS **6 + 6**

Vector functions, differentiation of vectors – Gradient, divergence and curl – Directional derivatives – Line, surface, and volume integrals (introductory concepts)

UNIT IV: ORDINARY DIFFERENTIAL EQUATIONS **6 + 6**

Second and higher order linear differential equations with constant coefficients – Variable coefficients – Euler Cauchy equation – Legendre's equation - Applications

UNIT V: PARTIAL DIFFERENTIAL EQUATIONS **6 + 6**

Formation of partial differential equations – Singular integrals – Lagrange's linear equation – Solution methods for second order homogeneous equations with constant coefficients

LIST OF EXPERIMENTS

1. Multivariable Calculus – Plot single – variable functions – Identify extrema using first and second derivative tests
2. Multivariable Optimization – Compute and visualize partial derivatives – Find local maxima/minima using contour plots
3. Area and Volume by Integration – Numerically compute double/triple integrals – Visualize regions of integration
4. Solving and Visualizing Ordinary Differential Equations – Euler's method – Runge-Kutta method
5. Solving Partial Differential Equations and Visualizing Solutions – Form and solve basic PDEs – Visualize solutions in 2D and 3D

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th edition, Wiley India Pvt Ltd, New Delhi, 2018
2. George B Thomas, D. Weir and J.Hass, Thomas Calculus, 13th edition, Pearson Education India, 2018

REFERENCES:

1. Grewal,B.S. Higher Engineering Mathematics, 44th Edition, Khanna Publishers, 2017
2. Douglas C. Montgomery, Applied Statistics and Probability for Engineers, 7th Edition, Wiley, 2019
3. Robert L. Devore, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage, 2012

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SEMESTER I

U25PH101	Engineering Physics (Common to all programmes)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To understand the fundamental mechanical and thermal properties of solids and fluids for real-world engineering applications
- To explore advanced concepts in ultrasonic waves and their applications in imaging, testing, and sensing technologies
- To gain insights into semiconductor physics and photonics for their role in modern electronic and optical systems

COURSE OUTCOMES:

CO 1: Explain the modulus of elasticity and stress-strain behavior of materials to infer the elastic properties of materials — **Understand**

CO 2: Examine the heat transfer in thermal systems and properties of fluids — **Analyze**

CO 3: Apply the principles of ultrasonics in testing, imaging, and communication technologies — **Apply**

CO 4: Estimate charge carrier transport in semiconductors and the performance of devices such as Hall effect sensors and Schottky diodes — **Apply**

CO 5: Organise the principles of laser and fiber optics for industrial and medical applications — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	-	-	1
CO 2	3	3	2	2	-	-	-	-	-	-	-	-	1
CO 3	3	2	1	1	-	-	-	-	-	-	-	1	-
CO 4	3	2	1	1	-	-	-	-	-	-	-	1	-
CO 5	3	2	1	1	-	-	-	-	-	-	-	1	-

SYLLABUS:

UNIT I: MECHANICAL PROPERTIES OF SOLIDS — 6 + 6

Modulus of Elasticity – Stress-strain diagram – Poisson's ratio – Elastic and plastic deformation – Stress-strain behaviour in metals, polymers and ceramics – Bending Moment – Cantilever – Applications (GIRDERS, MEMS)

UNIT II: FUNDAMENTALS OF HEAT TRANSFER AND FLUIDS — 6 + 6

Heat transfer – Thermal expansion – Heat conductivity – Lee's Disc method – Surface tension –Viscosity – Coefficient of viscosity using Poiseuille's flow experiment – Solar water heater – Microwave oven – Heat exchangers – Radiators – Cooling towers

UNIT III: ULTRASONICS AND ITS APPLICATIONS — 6 + 6

Properties of Ultrasonic waves – Production of ultrasonic waves – Piezoelectric Oscillator – Magnetostriction Oscillator – Velocity measurement of Ultrasonic waves – SONAR – Non-Destructive Testing – Ultrasound imaging in medicine – Ultrasonic scanning methods

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Learn Beyond

UNIT IV: SEMICONDUCTOR PHYSICS **6 + 6**

Properties – Direct and Indirect bandgap-semiconductor – Intrinsic and extrinsic Semiconductors – Carrier concentration in n-type semiconductor – P-type semiconductor – Carrier Transport in Semiconductor – Hall effect – Ohmic contacts – Schottky diode

UNIT V: PHOTONICS **6 + 6**

Interaction of Radiation with Matter – Laser Characteristics – Population Inversion – CO2 laser – Semiconductor Diode Laser – Laser applications – Total Internal Reflection – Structure and working principle of Optical fibre – Fiber optic Endoscopy – Fiber optic sensors

LIST OF EXPERIMENTS

1. Determine the moduli of elasticity of the given beams and evaluate them for different structural applications. (High/ Medium/Low modulus)
2. Evaluate the shear moduli of the different materials and rank them for suitable applications with reference to their strength
3. Select the most effective thermal insulation material from mica, cardboard, and glass for optimal heat protection
4. Determine the Viscosity of Liquids Using Poiseuille's Method and Identify the Fastest-Flowing Liquid
5. Measure the speed of ultrasound in liquids and calculate their compressibility for different hydraulic purposes
6. Categorize the specified semiconducting materials according to their energy bandgap values
7. Determine a semiconducting material's Hall coefficient and identify its type
8. Determination of wavelength of given laser and the particle size of the given samples using diffraction method
9. Use an optical fiber to measure its light-gathering capacity and calculate the propagation angle
10. Calculate the surface tension of different liquids and examine how surfactants affect it
11. Determination of wavelength of various spectral lines by using spectrometer and grating
12. Determination of velocity of light passing through glass medium using spectrometer

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. M.N. Avadhanulu, P.G. Kshirsagar, and T.V.S. Arun Murthy, "A Textbook of Engineering Physics", 11th edition, S. Chand Publishing, New Delhi, 2022
2. R.K. Gaur and S.L. Gupta, "Engineering Physics", 8th edition, Dhanpat Rai Publications, New Delhi, 2017

REFERENCES:

1. Harald Ibach and Hans Luth, "Solid State Physics: An Introduction", 4th edition, Springer Publications, 2020
2. Charles Kittel, revised by David Pines (Editor) "Introduction to Solid State Physics", 9th edition, Wiley & Sons, US, 2020
3. H.K. Malik and A.K. Singh "Engineering Physics" Publisher: McGraw Hill Education India 2022
4. https://onlinecourses.nptel.ac.in/noc20cy17/preview

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SEMESTER I

U25CY102	Applied Chemistry for Electronics Engineers (Common to BM, EC, EE, MI)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To explain the properties, classifications and engineering applications of polymeric materials
- To describe corrosion mechanisms and evaluate electrochemical principles relevant to energy conversion and storage technologies
- To investigate the materials and working principles underlying display technologies, photonic devices, sensors, and wafer fabrication processes

COURSE OUTCOMES:

CO 1: Execute polymer synthesis, molecular weight determination using viscometry, and the structure–functional behavior of polymers in electronic applications.(Apply) **Apply**

CO 2: Utilize appropriate corrosion prevention and coating strategies for engineering materials based on corrosion analysis. **Apply**

CO 3: Implement appropriate energy storage devices and colorimetric analysis based on photochemical principles **Apply**

CO 4: Execute sensor principles in pH-metric and conductometric titrations for solution analysis and in materials used for display and smart sensing devices. **Apply**

CO 5: Employ wafer fabrication techniques for manufacturing micro- and nanoelectronic devices and for extracting copper from PCB boards. **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	-	-	1	1	-	1	-	1
CO 2	3	2	1	1	-	-	-	1	1	-	1	-	1
CO 3	3	2	1	1	-	-	-	1	1	-	1	-	1
CO 4	3	2	1	1	-	-	-	1	1	-	1	1	-
CO 5	3	2	1	1	-	-	-	1	1	-	1	1	-

SYLLABUS:

UNIT I: POLYMERIC MATERIALS **6 + 6**

Polymers – classification and properties, Polymer compounding: (Compression, Injection, Extrusion) – Conductive Polymers – (PANI, PEDOT) Synthesis, Properties, Mechanism and applications, Photochromic polymers: Azobenzenes, Diarylethenes – Mechanism of photo-switching, Electroluminescent polymers – Fabrication of light-emitting electrochemical cells and application, Biopolymers – PLA – Synthesis and applications – Packaging materials for integrated circuits – Purpose, key components and types

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UNIT II: CORROSION SCIENCE **6 + 6**

Types of corrosion – dry,wet – Electrochemical theory – Electrochemical series - Factors influencing corrosion and control methods – Cathodic protection – Corrosion inhibitors – anodic, cathodic, mixed – Metallic coatings – Electroplating – Tinning, Phosphating, Carburizing, Nitriding, Protective Coatings – Advanced surface treatments and protective coatings – powder and antifouling coatings – Self-healing and corrosion-sensing paints

UNIT III: ENERGY CONVERSION AND STORAGE **6 + 6**

Batteries – Classification, Fabrication & working – Li-polymer, $LiFePO_4$ – Fuel Cells (Proton Exchange Membrane, Solid Oxide Fuel Cell, Microbial Fuel Cells) and Green Hydrogen Technologies – Laws of Photochemistry – Jablonski Diagram, Solar Cells – Dye-Sensitized Solar Cells, Supercapacitors – Electrostatic double layer, Pseudocapacitors, Hybrid Supercapacitors

UNIT IV: MATERIALS FOR DISPLAY AND SENSING DEVICES **6 + 6**

Liquid Crystal Displays, OLED, QLED – structure, properties and mechanism – Emerging Display Materials – Perovskite emitters – Phase-Change Memory (PCM) materials – Sensors – Electrochemical sensor, Conductometric, Potentiometric, pH metric titrations – principle, working and applications

UNIT V: WAFER TECHNOLOGY **6 + 6**

Semiconductors (GaAs, SiGe), Insulators and High Resistive Materials (Porcelain, Bakelite, Transformer oil, Epoxy, SF_6) – Wafer Manufacturing and Purification – Czochralski and Float Zone methods and applications – Photolithography and Microfabrication – Epitaxial Growth and its Significance – Smart Materials and Nano-enabled Devices – MEMS & NEMS

LIST OF EXPERIMENTS

1. Synthesis of Polyaniline (PANI) and Bakelite
2. Determination of molecular weight and degree of polymerisation of a given polymer using an Ostwald viscometer
3. Determination of rate of corrosion of mild steel by weight loss method
4. Potentiometric estimation of Fe present in corrosion medium
5. Estimate the concentration of copper (Cu^{2+}) or nickel (Ni^{2+}) in a given solution using colorimetric analysis based on Beer-Lambert's law
6. Evaluate the strength of the given HCl by pH metry
7. Determination of the amount of HCl present in the given solution by conductometric titration
8. Recover copper from waste printed circuit boards (PCBs) using chemical methods and estimate the amount of copper recovered using appropriate analytical techniques

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. Wiley India Pvt. Ltd., "Engineering Chemistry", 2nd edition, Wiley India Pvt. Ltd., New Delhi, 2013
2. S.S. Dara and S.S. Umare, "A Textbook of Engineering Chemistry", 12th edition, Chand Publishing, New Delhi, 2024
3. R.V. Gadag and A. Nityananda Shetty, "Engineering Chemistry", 3rd edition, I.K. International Publishing House, New Delhi, 2014
4. Sunita Rattan, "Experiments in Applied Chemistry", 3rd edition, S.K. Kataria & Sons, New Delhi 2021

REFERENCES:

1. Fred W Billmeyer, "Textbook of Polymer Science", 4th edition, John Wiley & Sons, New York, 1999

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2. Lieng-Huang Lee, "Conductive Polymers and Plastics: In Industrial Applications", 1st edition, Springer, New York, 1990
3. M.F. Ashby and D.R.H. Jones, "Engineering Materials 2: An Introduction to Microstructures, Processing and Design", 4th edition, Elsevier, UK, 2012
4. Kirby W Beard, "Linden's Handbook of Batteries", 5th edition, McGraw Hill, New York, 2019
5. G.A Ozin and C.A. Andre, "Nanochemistry: A Chemical Approach to Nanomaterials", 2nd edition, Royal Society of Chemistry, Cambridge, 2005

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Learn Beyond

SEMESTER I

U25CSG01	Problem Solving using C Programming (Common to AD, AM, BM, CB, CS, EC, EE, IT, SC)	Category: ESC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To enable students to understand the fundamentals of C programming, including problem-solving techniques, flowcharts, algorithms, and the structure of a C program
- To impart knowledge on arrays, strings, functions, and pointers to efficiently solve computational problems using modular programming
- To introduce structured data types like structures and unions and demonstrate their use in handling complex data
- To familiarize students with file handling operations and apply C programming constructs to solve real-world problems

COURSE OUTCOMES:

CO 1:	Explain fundamental programming concepts and control structures used in C for problem-solving	**Understand**
CO 2:	Implement and Manipulate one and two dimensional array and strings for basic processing	**Apply**
CO 3:	Apply function, recursion, and pointers for effecient problem solving	**Apply**
CO 4:	Apply structures, unionsm and storage classes to organize and manage complex data effectively in C Programs	**Apply**
CO 5:	Implement file handling concepts and operations, including text and binary files, error handling and command-line arguments	**Apply**

CO - PO MAPPING:

Particuiar	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	2	-	-	-	-	-	-	-	-	-	1	-
CO 2	3	2	1	1	-	-	-	-	-	-	2	1	-
CO 3	3	2	1	1	-	-	-	-	-	-	2	1	-
CO 4	3	2	1	1	-	-	-	-	-	-	2	1	-
CO 5	3	2	1	1	1	-	-	-	-	-	2	1	-

SYLLABUS:

UNIT I: C PROGRAMMING BASICS **6 + 6**

Fundamentals of Problem Solving – Importance of logical and analytical thinking – Algorithm – Flow Chart – Pseudo code – Introduction to C programming – Structure of a C program – Compilation and linking processes – C Programming Constructs: Keywords, Identifiers, Constants – Variables – Data Types – Operators – Managing I/O operations – Conditional Statements – Looping statements

UNIT II: ARRAYS AND STRINGS **6 + 6**

Array: Declaration and Initialization – Accessing and manipulating array elements – One-dimensional array – Two-dimensional array – Strings: Declaring and initializing strings – String operations – String Arrays – Practice problems based on real-world applications

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UNIT III: FUNCTIONS AND POINTERS **6 + 6**

Functions: Definition – Function call – Return statement – Types of Functions – Recursion. Pointer: Declaration – Initialization – Passing arguments by value vs by reference – Pointer to pointer – Array of Pointers – Dynamic Memory Allocation: malloc(), calloc(), realloc(), free()

UNIT IV: STRUCTURES AND UNION **6 + 6**

Grouping data using structures – Declaring structure variables – Accessing members using dot (.) operator – Nested Structures – Arrays of Structures – Pointer to Structure – Access members through pointers (→) operator – Memory sharing in unions – Storage classes

UNIT V: FILE HANDLING **6 + 6**

Importance of File Handling – Types of files – File modes – File operations: Open, Read, Write, Close – Serialization and file operations with DAT files – Common errors in file handling – File pointers: ftell(), fseek(), rewind() – Command line arguments – Practical Exercises Using Files for Data Persistence

LIST OF EXPERIMENTS

1. Demonstrating the use of simple statements and expressions in C
2. Implementing the flow control of programs using decision and iteration constructs
3. Demonstrating the creation and manipulation of arrays in C
4. Programs using string operations
5. Illustrate function declaration, definition, and calling mechanisms
6. Hands-on practice with recursive solutions for mathematical problems
7. Hands-on practice with pointers in memory access and manipulation
8. Applications of structures and unions in organizing and processing data
9. Implementation of file operations such as open, read, write, append, and close
10. Perform arithmetic operations using values passed through command line

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. David D. Railey and Kenny A.Hunt , "Computational Thinking for Modern problem Solver", 1st Edition, CRC Press, 2014
2. Brian W. Kernighan and Dennis Ritchie, "The C Programming Language", 2nd Edition, Pearson, 2015

REFERENCES:

1. Paolo Ferragina and Fabrizio Luccio, "Computational Thinking First Algorithms", Then Code",1st Edition, Springer International Publishing, 2018
2. Reema Thareja, "Programming in C", 2nd Edition, Oxford University Press, 2016
3. Paul Deitel and Harvey Deitel, "C How to Program", 7th Edition, Pearson Publication, 2015
4. Juneja, B. L and Anita Seth, "Programming in C",1st Edition, Cengage Learning India Pvt. Ltd., 2011
5. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", 1st Edition, Oxford University Press, 2009

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Learn Beyond

SEMESTER I

U25CSG03	Digital Technologies (Common to all programmes)	Category: ESC				
		L	T	P	J	C
		1	0	0	0	1

COURSE OBJECTIVES:

- To explain the foundational concepts of AI, IoT, cloud, cybersecurity, and blockchain technologies
- To apply practical knowledge of OpenAI, RPA, and digital marketing strategies effectively
- To analyse interconnected sart systems, big data, and evolving digital landscapes
- To evaluate ethical implications of AI, data privacy, and societal impact of technologies

COURSE OUTCOMES:

CO 1: Understand the foundational concepts of AI, ML, DL, and key OpenAI generative tools **Understand**

CO 2: Explain the interplay of AI, wearables, and big data in emerging technologies like the Metaverse and Edge AI **Understand**

CO 3: Describe the key components and uses of IoT, cloud computing, and cybersecurity, including common threats **Understand**

CO 4: Interpret the core principles and practical uses of blockchain, RPA, and digital marketing strategies **Understand**

CO 5: Recognize the key concepts and applications of 3D printing, digital manufacturing, AR/VR, Metaverse, and ethical considerations in AI **Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	2	1	1	1	-	-	-	-	1	1	-
CO 2	3	3	2	2	1	1	-	1	1	1	1	1	-
CO 3	3	2	3	1	2	1	-	1	2	2	1	1	-
CO 4	3	2	1	3	3	1	-	1	-	1	-	1	-
CO 5	3	2	1	1	2	1	1	1	-	1	1	1	-

SYLLABUS:

UNIT I: MODERN ARTIFICIAL INTELLIGENCE AND OPENAI TOOLS **6**

An Overview of Artificial Intelligence – Introduction to Machine Learning and Deep Learning – ChatGPT – GPT 4 – OpenAI Tools: AI Text Classifier – OpenAI Tools: Point-E – Text to Image Generator – DALL-E

UNIT II: MART SYSTEMS AND ANALYTICS **6**

Intelligent Wearables – AI and Metaverse – Edge AI / TinyML – Evolution of Big Data Analytics –Applications of Big Data Analytics

UNIT III: IOT, CLOUD, CYBERSECURITY ESSENTIALS **6**

Internet of Things – Applications of IoT – Industrial Internet of Things or IIoT – Digital Payments –Overview of Cloud Computing – Applications of Cloud Computing – Service Models in Cloud Computing – Overview of Cybersecurity – Applications of Cybersecurity – Types of Cyber Attacks – Data Privacy and User Data Control – Deepfake

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UNIT IV: DIGITAL INNOVATION AND AUTOMATION 6

Evolution of Blockchain – Applications of Blockchain in Finance Industry – Impact of Blockchain on Workforce & Workplace – Getting Started with Robotic Process Automation – Applications of Robotic Process Automation in Banking & Insurance Industry – Web, Mobile Development and Marketing – 5Ds of Digital Marketing – Digital Storytelling

UNIT V: DIGITAL DESIGN AND RESPONSIBILITY 6

3D Printing Modelling – Digital Manufacturing – Augmented Reality and Virtual Reality – Pre-requisites for Augmented Reality & Virtual Reality – Metaverse – Applications of Augmented Reality – Virtual Reality in – AI Ethics – Ethical Considerations of Generative AI

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 30 Periods

TEXTBOOKS:

1. Faheem Syeed Masoodi, Zubair Sayeed Masoodi, Khalid Bashir Dar, "Digital and Technological Solutions: Exploring the Foundations of Digitization", 1st Edition, BPB Publications, 2024

REFERENCES:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", 4th Edition, Pearson, 2020
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach" Universities Press, 2014
3. Dieter Schmalstieg, Tobias Hollerer, "Augmented Reality: Principles and Practice", Addison-Wesley, 2016
4. Daniel Drescher, "Blockchain Basics: A Non-Technical Introduction in 25 Steps" Apress, 2017
5. Xiaofei Wang, Yunchuan Sun, "Edge AI: Convergence of Edge Computing and Artificial Intelligence", Wiley, 2022
6. Mark Coeckelbergh, "AI Ethics", MIT Press, 2020
7. https://www.futureskillsprime.in/journey/digital-101-30-hours/ - Digital 101 Futureskills Prime Course by NASSCOM

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Learn Beyond

SEMESTER I

U25EE101	Electrical Engineering Disciplines and Skills	Category: PCC				
		L	T	P	J	C
		1	0	4	0	3

COURSE OBJECTIVES:

- Introduce students to the fundamental concepts and scope of electrical engineering
- Familiarize students with various electrical components, systems, and safety standards
- Provide hands-on experience through practical experiments and industry visits
- Develop an understanding of industrial instrumentation and monitoring systems

COURSE OUTCOMES:

CO 1:	Describe the evolution, scope, and fundamental quantities in electrical engineering	**Understand**
CO 2:	Design various electrical wiring components and layouts in residential and industrial settings	**Apply**
CO 3:	Analyze basic electrical machines, power systems, control and automation concepts	**Analyze**
CO 4:	Apply knowledge of electrical safety codes, standards, and regulations in practical scenarios	**Apply**
CO 5:	Assess the concept of industrial instrumentation systems and the integration of IoT and smart sensors	**Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	-	-	-	-	-	-	-	-	-	2	-	2
CO 2	3	2	2	-	-	-	-	-	-	-	2	-	2
CO 3	3	2	2	1	-	-	-	1	1	-	2	-	2
CO 4	3	2	2	-	-	2	2	1	1	-	2	-	2
CO 5	3	2	2	1	-	-	-	1	1	-	2	-	2

SYLLABUS:

UNIT I: INTRODUCTION TO ELECTRICAL ENGINEERING **3 + 12**

Evolution and scope of electrical engineering – SI Units – Generation, Transmission and Distribution – Electrical quantities: DC current and voltage – AC current and voltage – Power – Energy – Power factor

UNIT II: ELECTRICAL WIRING **3 + 12**

Switches – fuses – Introduction to electrical wiring layouts – Residential and industrial wiring – Cables – Types of Lamps: Fluorescent, CFL and LED

UNIT III: CORE ELECTRICAL ENGINEERING **3 + 12**

Power Systems: Basics of single-line diagrams – Electrical Machines: Introduction to DC and AC machines – Applications - Control & Automation: Basics of PLC, SCADA, DCS – Power Electronics: Converters – UPS

UNIT IV: ELECTRICAL SAFETY CODES AND STANDARDS **3 + 12**

Safety policies and procedures – Earthing – National and international standards: IS, IEC, IEEE, NEC – Indian Electricity Act and rules –Roles of BIS, CEA, and other regulatory bodies – ISO standards (ISO 45001)

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UNIT V: INDUSTRIAL INSTRUMENTATION AND MONITORING SYSTEMS **3 + 12**

Calibration, accuracy, and standards in measurement – Signal conditioning and analog-to-digital conversion – Data acquisition systems – Introduction to smart grid and IoT

LIST OF EXPERIMENTS

1. Industry visit – Electrical machines
2. Industry visit – Transformers and protection
3. Industry visit – Power systems
4. Industry visit – Power electronics and drives
5. Industry visit – Electric vehicles
6. Hands on training – Fire protection safety using fire extinguisher

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** 60 Periods **Project:** - Periods **Total:** 75 Periods

TEXTBOOKS:

1. Kothari D.P., Nagrath I.J., "Basic Electrical Engineering", Tata McGraw-Hill Education, 2011
2. Uppal S.L., "Electrical Wiring, Estimating and Costing", 8th reprint, Khanna Publishers, 2018

REFERENCES:

1. S.K. Bhattacharya, "Electrical Machines", McGraw–Hill Education, New Delhi, 4th edition, July 2017
2. R.K.Rajput, "Electrical Machines", Laxmi Publications, 6th edition, Jan 2016
3. V.K Metha and Rohit Metha, "Principles of Electronics", S.Chand Publications, 12th edition, 2020
4. Maxwell Adams, "Fundamentals of Electrical Safety", CRC Press, 2018
5. Central Electricity Authority (CEA), "Electrical Safety Manual", Government of India, 2020

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SEMESTER I

U25LEG01	German for Engineers - I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of German grammatical structures to support communication and comprehension
- Gain introductory insights into German cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1:	Acquire familiarity in the German alphabet & basic vocabulary	**Understand**
CO 2:	Listen and identify individual sounds of German	**Understand**
CO 3:	Use basic sounds and words while speaking	**Apply**
CO 4:	Read and understand simple advertisements, brochures and invitations	**Understand**
CO 5:	Use basic grammar and appropriate vocabulary in completing language tasks	**Remember**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: INTRODUCTION TO GERMAN LANGUAGE AND SOUNDS **6 + 3**

Alphabet and pronunciation (phonetics and name spelling) – Basic greetings and farewells – Asking for and giving personal information – Countries – Languages – Professions – Numbers (0–100) – Cultural focus: German-speaking countries

UNIT II: GRAMMAR FOUNDATIONS AND SENTENCE BUILDING **6 + 3**

Formal vs. informal register: Sie vs. du – Personal pronouns: ich - du -Sie - er - sie - es – Verb conjugation in Präsens (regular and irregular) – Verbs: sein - haben (to be - to have) – Questions: wo -wer - wie - was - etc – Yes/No questions (Ja-/Nein-Fragen) – Cultural focus: Formal vs. informal speech

UNIT III: DAILY LIFE AND ROUTINES **6 + 3**

Describing daily activities and routines – Talking about time – Days – Routine verbs and nouns – Grammar: Separable verbs (aufstehen - mitkommen) – Modal verbs (intro): können - müssen – Negation: nicht - kein – Cultural focus: Typical German daily schedules

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UNIT IV: GRAMMAR – CASES AND STRUCTURE **6 + 3**

Accusative case: articles and pronouns – Dative case: definite and indefinite articles – Grammar focus: Prepositions with dative (in, auf, bei, mit, zu) – Cultural focus: Office hours and punctuality in German culture

UNIT V: NAVIGATION AND PUBLIC INTERACTION **6 + 3**

Asking for/giving directions – Describing locations and surroundings – Places in the city: Supermarkt, Bahnhof – Post – Kino – Reading and understanding public signs – Maps – Timetables – Grammar: Imperative (basic usage for giving directions) – Cultural focus: Public transportation – City services in German-speaking countries

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Buscha- A & Szita, S-Begegnungen Deutsch als Fremdsprache A1+: Integriertes Kurs- und Arbeitsbuch- 1st Edition, 2021
2. Brüseke, R., "Grammatik leicht A1," 1st Edition-2019

REFERENCES:

1. Netzwerk Deutsch als Fremdsprache A1, 1st Edition: BlueNBells, 2012
2. Huber, K., & Keller, F., "DaF kompakt A1: Deutsch als Fremdsprache," 3rd Edition, Langenscheidt, 2018

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SEMESTER I

		Category: HSMC				
		L	T	P	J	C
U25LEG02	Japanese for Engineers - I (Common to all programmes)	1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of Japanese grammatical structures to support communication and comprehension
- Gain introductory insights into Japanese cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1:	Acquire familiarity in the Japanese alphabet and basic vocabulary	**Understand**
CO 2:	Listen and identify individual sounds of Japanese	**Understand**
CO 3:	Use basic sounds and words while speaking	**Apply**
CO 4:	Read and understand simple advertisements, brochures and invitations	**Understand**
CO 5:	Use basic grammar and appropriate vocabulary in completing language tasks	**Remember**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: INTRODUCTION TO JAPANESE WRITING AND GREETINGS **6 + 3**

Hiragana Mastery – Basic greetings & expressions – Desu (~です) – Particles: は (wa), の (no), か (ka) – Basic vocabulary: Professions, countries, school related terms – Cultural note: Bowing – Formal vs. informal speech

UNIT II: KATAKANA AND BASIC COMMUNICATION **6 + 3**

Katakana Mastery – Numbers -time - and age expressions – Vocabulary: Objects, locations and daily expressions – Particles: を (wo), - に (ni) - で (de) – Grammar: Arimasu / Imasu (existence) – Negation: じゃありません / ではありません – Cultural note: Japanese use of numbers and time in daily life

UNIT III: VERB BASICS AND SENTENCE STRUCTURE **6 + 3**

Verb sentence structure – Verb conjugation basics: Non-past affirmative/negative – Asking about objects – Time and location expressions – Vocabulary: Places - classroom items - basic actions – Cultural note: School and work environments in Japan

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UNIT IV: DAILY ACTIVITIES AND VOCABULARY EXPANSION

6 + 3

Daily routine verbs: おきます, たべます, ねます, etc., – Days of the week – Frequency expressions – Vocabulary: Food - drink - daily routine – Common locations: Library - school - station – Particles: は, を, に, で, も, へ – Cultural note: Japanese daily life and food habits

UNIT V: INTRODUCTION TO KANJI AND PRACTICAL USE

6 + 3

Kanji: Recognition (~50), Writing (~30) – Practical reading and writing exercises using learned Kanji – Review of particles in context – Integration of all skills through short dialogues and written practice – Cultural note: Importance of Kanji in Japanese society and signage

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. 3A Corporation, "Minna no Nihongo Shokyū I: Main Textbook," 2nd Indian Edition, Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2018
2. Banno, Eri, Yutaka Ohno, Yoko Sakane, Chikako Shinagawa, and Kyoko Tokashiki, "Genki I: An Integrated Course in Elementary Japanese," 3rd Edition, The Japan Times Publishing, Tokyo, 2020

REFERENCES:

1. Yamada, M., & Fujita, T., "Japanese for Beginners: A Practical Approach," 1st Edition, Tuttle Publishing, 2019
2. Takahashi, A., & Sato, M., "Nihongo Pro: Japanese for N5 Level," 1st Edition, KADOKAWA, 2018

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Learn Beyond

SEMESTER I

U25LEG03	French for Engineers - I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of French grammatical structures to support communication and comprehension
- Gain introductory insights into French cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1:	Acquire familiarity in the French alphabet and basic vocabulary	**Understand**
CO 2:	Listen and identify individual sounds of French	**Understand**
CO 3:	Use basic sounds and words while speaking	**Apply**
CO 4:	Read and understand simple advertisements, brochures and invitations	**Understand**
CO 5:	Use basic grammar and appropriate vocabulary in completing language tasks	**Remember**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: INTRODUCTION TO FRENCH LANGUAGE AND BASICS **6 + 3**

Alphabet and pronunciation: French sounds – Accents – Spelling names – Greeting people and introducing yourself and others – Asking about someone: names – Nationalities, and countries – Grammar: Subject pronouns (je, tu, il, elle…) - être (to be) - s'appeler (to be called) – Articles: definite/indefinite (le, la, un, une) -Gender and number of nouns – Cultural focus: French-speaking countries – forms of address (tu vs. vous)

UNIT II: DESCRIBING PEOPLE AND BACKGROUND **6 + 3**

Describing yourself and others: nationality – profession – Age – Asking and answering personal questions – Numbers: 0–69 – Talking about languages spoken – Grammar: Verbs avoir (to have parler (to speak) – Negation: ne…pas – Cultural focus: Francophone diversity – naming conventions (nom, prénom)

UNIT III: GRAMMAR AND AGREEMENT IN DESCRIPTIONS **6 + 3**

Gender agreement of adjectives and professions – Asking questions: Interrogative expressions (Où, Quoi, Qui, Quel(le)) – Practice with personal descriptions – More on sentence structure and simple dialogues – Cultural focus: Intercultural identity – Polite introductions and small talk

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UNIT IV: TALKING ABOUT DAILY LIFE **6 + 3**

Describing a typical day – Talking about daily activities and frequency – Saying what you like/don't like doing – Talking about schedules and routines – Cultural focus: A typical day in France – school/work life in Francophone countries

UNIT V: TIME, VERBS, AND DAILY EXPRESSIONS **6 + 3**

Telling time – grammar: Regular -er verbs in present tense – The verb aller (to go) and expressions with faire – Prepositions: à -chez - en - au -Cultural focus: French meal times – Weekend habits – Transportation

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Marie-José Lopes & Jean-Thierry Bougnec, "Inspire 2 A1-A2 Méthode de français," 1st Edition, Hachette Français Langue Etrangère, 2020
2. Gibbe, C., Berthet, A., & Hugot, C., "Édito A2: Méthode de français," 1st Edition, Didier, 2024

REFERENCES:

1. Chantal Fougères & Marc de la Harpe, "Le Nouveau Sans Frontières 2: Méthode de français A2," 1st Edition, Hachette FLE, 2020
2. Xavier Maingueneau, "Le Français pour les Nuls: A2-B1," 3rd Edition, Wiley, 2021

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SEMESTER I

U25LEG04	Hindi for Engineers - I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of Hindi grammatical structures to support communication and comprehension
- Gain introductory insights into Hindi cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1:	Acquire familiarity in the Hindi alphabet and basic vocabulary	**Understand**
CO 2:	Listen and identify individual sounds of Hindi	**Understand**
CO 3:	Use basic sounds and words while speaking	**Apply**
CO 4:	Read and understand simple advertisements, brochures and invitations	**Understand**
CO 5:	Use basic grammar and appropriate vocabulary in completing language tasks	**Remember**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: UNIT I INTRODUCTION TO HINDI SCRIPT AND CULTURE **6 + 3**

Devanagari script basics (vowels and consonants) – Hindi sound system (aspirated/unaspirated, retroflex sounds) – Basic greetings and self-introduction – Sentence ending with है (hai) – Vocabulary: Professions – Nationalities – Countries – Family members – Grammar: Personal pronouns (मैं, तुम, आप, वह, यह) – Use of है and क्या (kya) for yes/no questions – Simple nominal sentences – Cultural note: Indian naming conventions – Forms of address (तुम vs. आप) – Gestures like namaste and head nods – Sociolinguistic formality

UNIT II: SENTENCE STRUCTURE AND EVERYDAY CONTEXTS **6 + 3**

Introducing others – Talking about objects and places – Yes/no and WH- questions – Negation using नहीं – Use of यह (yeh) – वह (voh) – Vocabulary: Everyday objects – Common locations – Classroom and household terms – Grammar: Postpositions में (mein), से (se), का/की/के (possessives) – Verb basics with है and नहीं है, Subject-object-verb (SOV) structure – Cultural note: Spatial metaphors in Hindi, gestures with demonstratives, plural forms, and respect levels

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UNIT III: DESCRIBING DAILY LIFE AND HABITS

6 + 3

Describing daily routines like waking – Eating – Going – Returning – Sleeping – Vocabulary: Daily activities – Time expressions – Common verbs – Talking about routines in present tense – Adverbs of frequency: हमेशा - कभी-कभी - कभी नहीं – Grammar: Present tense of जाना - खाना - करना - उठना - सोना – Verb agreement by gender and number – Use of को (ko) as object marker – Cultural note: Time perception – Daily routines in Indian homes – Lifestyle differences – Typical student/professional day

UNIT IV: EXPANSION OF VERB USE AND QUESTIONS

6 + 3

Extended verb usage in different contexts – Asking and answering questions with Wh-words – Expressing possession – Giving simple commands and requests – Vocabulary: Verbs of movement – Expression – Need – Grammar: Imperatives – Compound verbs – Continued use of postpositions – Sentence expansion using connectors – Cultural note: Politeness in commands – Body language in communication – Informal/formal tone shift

UNIT V: PRACTICAL COMMUNICATION AND REVIEW

6 + 3

Role-plays: shopping – Traveling, introducing family – Speaking about preferences and opinions – Listening to simple dialogues and identifying key points – Vocabulary: Common nouns – Adjectives – Survival phrases – Grammar: Review of present tense – Pronouns – Postpositions – Negation – Cultural note: Real-life communication scenarios – Marketplace culture – Indian transportation and hospitality norms

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Pavithra Publications, "Spoken Hindi: Through Tamil," 2nd Edition, Pavithra Publications, Chennai, 2015
2. Dakshina Bharat Hindi Prachar Sabha, "Prathamic Text Book: New Syllabus," 1st Edition, Dakshina Bharat Hindi Prachar Sabha, Madras, 2023

REFERENCES:

1. Ganga, K., & Ramesh, V., "Learn Hindi in 30 Days: A Beginner's Guide," 3rd Edition, Hindi Academy, 2020
2. Vyas, S., "Spoken Hindi for Beginners," 1st Edition, Orient BlackSwan, 2018

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SEMESTER I

U25LEG09	Chinese for Engineers - I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of Chinese grammatical structures to support communication and comprehension
- Gain introductory insights into Chinese cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1:	Acquire familiarity in the Chinese alphabet & basic vocabulary	**Understand**
CO 2:	Listen and identify individual sounds of Chinese	**Understand**
CO 3:	Use basic sounds and words while speaking	**Apply**
CO 4:	Read and understand simple advertisements, brochures and invitations	**Understand**
CO 5:	Use basic grammar and appropriate vocabulary in completing language tasks	**Remember**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: FUNDAMENTAL CHINESE FOR BEGINNERS **6 + 3**

Introduction to Mandarin Chinese, daily greetings – Learning Mandarin alphabet initials, finals, 4 tones and tone change rules (Pinyin 拼音) – Learning numbers 0–20 – Learning basic in-class vocabulary and phrases

UNIT II: NUMBERS AND VOCABULARY EXPANSION **6 + 3**

Learning numbers up to 999 – Learning country names and nationalities – Learning personal pronouns and Subject-Verb-Object (SVO) sentence structure – Practice with short dialogues and self-introductions

UNIT III: THE NEW CLASSMATE **6 + 3**

Learning vocabulary related to names and introductions – Learning the differences among 是 (to be), 叫 (to be called), 姓 (to have a surname) – Learning how to form questions with 嗎 – Learning abbreviated questions with 呢 – Practice dialogues: exchanging names and personal details

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UNIT IV: TIME AND POSSESSION

6 + 3

What time do you go to the university? – Learning vocabulary for time, dates, and days of the week – Learning grammar: placement of time words (S + Time word + V) – Learning to express possession with 有 / 沒有 – Learning the usage of 的 as a possessive particle – Practice with daily schedules and activities

UNIT V: COMMUNICATION AND REVIEW

6 + 3

Grammar consolidation: auxiliary verbs and sentence order – Forming positive-negative questions (e.g., 是不是, 有沒有) – Conversational practice: greetings, introductions, time, possession – Role-play in real-life scenarios – Cultural notes: politeness and forms of address – Final review and integrated practice of Units I–IV

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Mandarin Training Centre, National Taiwan Normal University, Modern Chinese I時代華語 I, Edited by Chih-Ping Chou, Taipei: Cheng Chung Book Company Ltd., 2019
2. Huayu101 / 華語101, Taiwan Ministry of Education, Taiwan Mandarin Educational Resources Centre, 2018

REFERENCES:

1. Cheng Chung Book Company Ltd, 時代華語 I 教師手冊 [Modern Chinese I Teacher's Manual, 2019
2. www.lmit.edu.tw/bag

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Learn Beyond

SEMESTER I

U25MCC01	Induction Program - Universal Human Values I (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		2	1	0	0	3

COURSE OBJECTIVES:

- Development of a holistic perspective based on self-exploration about themselves (human beings), family, society, and nature/existence
- Understanding (or developing clarity) of the harmony in the human being, family, society, and nature/existence
- Strengthening of self-reflection
- Development of commitment and courage to act

COURSE OUTCOMES:

CO 1:	Recognize the essentials of human values and skills	**Understand**
CO 2:	Analyse connection between profession and happiness	**Understand**
CO 3:	Develop appropriate technologies and management patterns to create harmony in family and society	**Understand**
CO 4:	Evaluate the significance of trust, mutually satisfying human behaviour, and enriching interaction with nature	**Understand**
CO 5:	Demonstrate professional and ethical responsibility	**Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	3	3	-	-	-	3	-	-
CO 2	-	-	-	-	-	3	3	3	-	-	3	-	-
CO 3	-	-	-	-	-	3	3	-	-	-	3	-	-
CO 4	-	-	-	-	-	3	3	-	-	-	3	-	-
CO 5	-	-	-	-	-	3	3	3	-	-	3	-	-

SYLLABUS:

UNIT I: INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT, AND PROCESS FOR VALUE EDUCATION **6 + 3**

Purpose and motivation for the course – Self-Exploration: what is it – Its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self-exploration – Continuous Happiness and Prosperity – A look at basic Human Aspirations – Right understanding, Relationship, and Physical Facilities – the basic requirements for the fulfillment of aspirations of every human being with their correct priority – Understanding Happiness and Prosperity correctly – A critical appraisal of the current scenario – Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT II: HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF **6 + 3**

Understanding human beings as a co-existence of the sentient 'I' and the material 'Body' – Understanding the needs of Self ('I') and 'Body' – Happiness and Convenience – Understanding the Body as an instrument of 'I' (I being the doer, seer, and enjoyer) – Understanding the harmony of I with the Body: Self-control and Welfare; correct appraisal of Physical needs – Meaning of Prosperity in detail – Programs to ensure Self-control and Welfare

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UNIT III: HARMONY IN THE FAMILY AND SOCIETY

6 + 3

Understanding values in human – Human relationships; the meaning of Justice (nine universal values in relationships) and the program for its fulfillment to ensure satisfaction – Trust and Respect as the foundational values of relationship – Understanding the meaning of Trust – Difference between intention and competence – Understanding the meaning of Respect – The Difference between respect and differentiation; and the other salient values in relationship – Understanding the harmony in the society (society being an extension of the family): Peace, Prosperity, Courage, and Coexistence as comprehensive Human Goals – Visualizing a universal harmonious order in society – Undivided Society – Universal Order from family to world family

UNIT IV: HARMONY IN THE NATURE AND EXISTENCE

6 + 3

Understanding the harmony in Nature, Interconnectedness, and mutual fulfillment among the four orders of nature – Recyclability and self-regulation in nature – Understanding Existence as a Co-existence of mutually interacting units in an all-pervasive space – Holistic perception of harmony at all levels of existence – Practice sessions to discuss human beings as the cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology, etc

UNIT V: HARMONY ON PROFESSIONAL ETHICS

6 + 3

Natural acceptance of human values – Definitiveness of Ethical Human Conduct – Basic for Humanistic Education – Humanistic Constitution, and Humanistic Universal Order – Competence in professional ethics – Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people, friendly and eco-friendly production systems, and Ability to identify and develop appropriate technologies and management patterns for the above production systems – Case studies of typical holistic technologies, management models, and production systems – Strategy for a transition from the present state to Universal Human Order – At the level of the individual: as socially and ecologically responsible engineers, technologists, and managers – At the level of society: as mutually enriching institutions and organizations

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** 15 Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. R R Gaur, R. Asthana , G P Bagaria, A Foundation course in Human Values and Professional Ethics, 3rd Edition, Excel Books, New Delhi, 2024
2. Prof. K. V. Subba Raju, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition, 2013

REFERENCES:

1. Ivan Illich, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA, 1974
2. E. F. Schumancher, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain, 1973

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SEMESTER I

U25MCC02	Heritage of Tamils (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	0	0	1

COURSE OBJECTIVES:

- Learn the extensive literature of classical Tamil
- Review the fine arts heritage of Tamil culture
- Realize the contribution of Tamils in Indian freedom struggle

COURSE OUTCOMES:

CO 1:	Understand the extensive literature of Tamil and its classical nature	**Understand**
CO 2:	Understand the heritage of sculpture, painting and musical instruments of ancient people	**Understand**
CO 3:	Review on folk and martial arts of Tamil people	**Understand**
CO 4:	Realization of Thinai concepts, trade and victory of Chozha dynasty	**Understand**
CO 5:	Understand the contribution of Tamils in Indian freedom struggle, Self-esteem movement and siddha medicine	**Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 2	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 3	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 4	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 5	-	-	-	-	-	-	3	3	-	2	-	-	-

SYLLABUS:

UNIT I: LANGUAGE AND LITERATURE 3

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

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

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

UNIT III: FOLK AND MARTIAL ARTS 3

Tattooing, basket weaving,Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance – Sports and Games of Tamils

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UNIT IV: THINAI CONCEPT OF TAMILS 3

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

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

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

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 15 Periods

TEXTBOOKS:

1. Jayanthi Ravikrishna K, Heritage of Tamils, Sri Krishna publications, First Edition, 2023
2. S. Priyadharshini, Heritage of Tamils, V. K. Publications

REFERENCES:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை, International Institute of Tamil Studies, C.P.T Campus, Chennai
2. கணினித் தமிழ் - முனைவர். இல. சுந்தரம், விகடன் பிரசுரம், அண்ணா சாலை, சென்னை, திசம்பர் 2016
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, தமிழ்நாடு அரசு, சென்னை, ஆறாம் பதிப்பு 2020
4. Social Life of Tamils, Dr. K. K. Pillay, A joint publication of TNTB & ESC and RMRL (in print) University of Madras, Chennai, Second Edition 1975
5. The Contributions of the Tamils to Indian Culture, Dr.M.Valarmathi, International Institute of Tamil Studies, C.I.T Campus, Tharamani, Chennai, First Edition 1995

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SEMESTER I & II

U25MCC03	Design Thinking (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To understand the basics of Design Thinking, its principles, processes, and tools used
- To empathize with stakeholders and frame problems using structured tools and techniques
- To generate ideas, create prototypes, and present solutions effectively using design tools

COURSE OUTCOMES:

CO 1:	Explain purpose and features of design thinking process	**Understand**
CO 2:	Use required tools to empathize with the stockholders to identify the problem	**Apply**
CO 3:	Define the identified problem elaborately and clearly	**Apply**
CO 4:	Develop prototypes for conceptual solutions	**Apply**
CO 5:	Present the identified solution to all the stakeholders	**Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	1	2	3	2	-	-	-	-	1	1	1	1	-
CO 2	1	2	3	2	-	-	-	-	1	1	1	1	-
CO 3	1	2	3	2	-	-	-	-	1	1	1	1	-
CO 4	1	2	3	2	-	-	-	-	1	1	1	1	-
CO 5	1	2	3	2	-	-	-	-	1	1	1	1	-

SYLLABUS:

UNIT I: FUNDAMENTALS OF DESIGN THINKING **3 + 6**

Introduction to Design Thinking: Definition, relevance, and applications – Contexts and situations where Design Thinking is most effective – Core process of implementing Design Thinking – Stakeholders involved in a Design Thinking approach – Design The Thinking – Personal Visualization, The Wheel of Life, and Balancing Priorities – Understanding and appreciating the concept of 'Design' – The 3 Laws of Design Thinking

UNIT II: THE EMPHATHIZE STAGE **3 + 6**

Understanding Stakeholders – Role of Empathy in Design Thinking – Tools: Persona, Journey Mapping, Stakeholder Mapping, CATWOE, Cartographic Perspective (L0), Empathy Map – Case Study

UNIT III: THE DEFINE STAGE **3 + 6**

Problem Framing and Reframing – Role of a Design Thinker – Tools: Five Whys, Anti-Pattern, Problem Paraphrasing, Challenge Mapping – Introduction to LORD Skillset – Case Study

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UNIT IV: THE DIVERGENCE AND CONVERGENCE STAGE **3 + 6**

Ideation through Divergent and Convergent Thinking – Tools: Brainstorming, Metaphor, Random Association, End-State Visualization, 10gm–100gm–1000gm – Prototyping Basics – Wire framing – Case Study – Communicating for Effective Outcome

UNIT V: THE COMMUNICATION STAGE **3 + 6**

Presenting and Packaging Design Outcomes – Tools: 4Cs Framework, Naming, Packaging, Storyboarding, Presentation Techniques, Distribution Methods

LIST OF EXPERIMENTS

1. Personal Visualization
2. 3 Laws of Design Thinking®
3. Persona
4. Journey Mapping
5. Cartographic Perspective
6. Anti-Pattern, Problem Paraphrasing
7. Brainstorming
8. 10gm–100gm–1000gm
9. Prototyping Basics
10. Storyboarding
11. Presentation Techniques

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd., 2018
2. Idris Mootee, Design Thinking for Strategic Innovation, John Wiley & Sons Inc, 2013
3. Arun Jain, UnMukt: Science & Art of Design Thinking, School of Design Thinking, 2020

REFERENCES:

1. Roger Martin, The Design of Business: Why Design Thinking is the Next Competitive Advantage,Harvard Business Press, 2009
2. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), Design Thinking: Understand – Improve– Apply, Springer, 2011
3. Liedtka , Andrew King, Kevin Bennett , Book - Solving Problems with Design Thinking - Ten Stories of What Works, Columbia Business School Publishing, 2013
4. Maurício Vianna, Ysmar Vianna, Isabel K. Adler, Brenda Lucena, Beatriz Russo, Design thinking: Business Innovation, MJV Press, 2011
5. Burgelman, Christensen, and Wheelwright, Strategic Management of Technology and Innovation, 5th Edition, McGraw Hill Publications, 2017

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SEMESTER I & II

U25MCC04	Computer Fundamentals and Coding Essentials (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To develop an understanding of fundamental computing concepts such as data types, variables, operators and algorithmic problem-solving.
- To enable students to write, debug, and execute simple programs in C using control structures, arrays and strings for solving basic scientific and engineering problems.
- To introduce the basic structure and functioning of computer systems, including hardware, software, operating systems and file management.

COURSE OUTCOMES:

CO 1: Build basic computational concepts such as data types, variables, operators, algorithms to solve simple problems — **Apply**

CO 2: Develop simple programs using input/output operations, control structures, arrays, and strings in C language — **Apply**

CO 3: Describe the fundamental components of a computer system and explain the role of operating systems and file management in computing — **Understand**

CO - PO MAPPING:

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

SYLLABUS:

UNIT I: FUNDAMENTALS OF COMPUTING — **3 + 5**

Introduction to algorithms and flowcharts –Data types, variables, and operators

UNIT II: INTRODUCTION TO PROGRAMMING — **6 + 5**

Programming languages overview - Input/output, conditional statements, loops - Basic data structures: arrays and strings - Overview of Logic gates and basic digital circuits - System software

UNIT III: INTRODUCTION TO COMPUTERS — **6 + 5**

Evolution of Computers - Overview of computer hardware and software - Number Systems - Understanding input/output devices, memory, storage – Basics of operating systems and file management

LIST OF EXPERIMENTS

1. Identifying computer components
2. Installation and debugging of Operating System
3. Programs using variables and data types

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4. Programs using Conditional Statements
5. Programs using Loops and Iterations
6. Program using Nested Loops & Pattern Printing

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 30 Periods

TEXTBOOKS:

1. Glenn Brookshear J and Dennis Brylow, "Computer Science: An Overview" , 13th Edition, Perarson, 2020
2. Rajaraman V and Neeharika Adabala "Fundamentals of Computers", 6th Edition PHI Learning Private Limited, 2015
3. Yashavant Kanetkar, "Let Us C", 17th Edition, BPB Publications, 2020

REFERENCES:

1. Reema Thareja, "Programming in C", 2nd Edition, Oxford University Press, 2016
2. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", 1st Edition, Oxford University Press, 2009

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Learn Beyond

SEMESTER I & II

U25MCC05	Biology for Engineers (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To understand the biological concepts from an engineering perspective
- To understand the importance of human physiology and sensing techniques
- To perform the various laboratory tests with the relevant instruments / equipment

COURSE OUTCOMES:

CO 1:	Interpret the biological concepts of cell and its structure	**Understand**
CO 2:	Describe the importance of human physiology	**Understand**
CO 3:	Summarize the various sensing techniques and assistive devices	**Understand**
CO 4:	Utilize the instruments / equipment to perform the microbial growth and laboratory tests	**Precision**
CO 5:	Apply the principles to demonstrate the microbial growth and laboratory test	**Precision**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	1	-	-
CO 2	2	1	-	-	-	-	-	-	-	-	1	-	-
CO 3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO 4	3	2	1	1	-	-	-	1	2	1	1	-	-
CO 5	3	2	1	1	-	-	-	1	2	1	1	-	-

SYLLABUS:

UNIT I: BASICS OF CELL **5**

Cell structure and function – Cell division – Mitosis – Meiosis – Cell Membrane potential

UNIT II: HUMAN PHYSIOLOGY **5**

Circulatory system – Respiratory system – Digestive system – Neurology system Carbohydrates – Proteins and amino acid – Nucleic acid (DNA and RNA)

UNIT III: SENSING TECHNIQUES AND ASSISTIVE DEVICES **5**

Sensory organs: Eyes and ears – Visual aids – Hearing aids – Electronic nose – Electronic tongue – Electronic skin

UNIT IV: BIOINSPIRATION **15**

Demonstration on bionic principles in nature-inspired design – Exploration of biomimetic materials and their engineering applications – Identification of natural structures mimicked in robotics and sensors – Observation and analysis of bioinspired prototypes (e.g., soft actuators, lotus-effect surfaces)

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Learn Beyond

UNIT V: BASIC LABORATORY TESTS **15**

Separation of serum – Identification of blood groups – Estimation of blood pressure – Measurement of pH – Acquisition of ECG signals – Introduction to bioinformatics for biomedical data interpretation: visualization of gene/protein sequences, exploration of databases such as NCBI and UniProt, and understanding their applications in clinical diagnostics and personalized medicine

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Campbell N.A., Reece J.B., Urry L., Cain M.L. and Wasserman S.A., "Biology: A global approach", 12th edition, Pearson Education Ltd, 2020
2. Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., "Biology for Engineers", 1st edition, Tata McGraw-Hill, 2018
3. Elaine N. Marieb and Suzanne. M. Keller, "Essential of Human Anatomy and Physiology", 12th edition, Pearson Education, 2017

REFERENCES:

1. Leslie Cromwell, Erich A. Pfeiffer, Fred J. Weibell, "Biomedical Instrumentation", 2nd Edition, Prentice Hall, 2011
2. Arthur T Johnson, "Biology for Engineers", 1st edition, CRC press, 2011
3. David. L. Nelson, Michael. M. Cox, "Lehninger Principles of Biochemistry", 7th edition, WH Freeman, 2017
4. John Enderle and Joseph Bronzino, "Introduction to Biomedical Engineering", 3rd edition, Academic Press, 2012

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SEMESTER II

U25ENG02	English Proficiency II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		0	0	2	0	1

COURSE OBJECTIVES:

- Be an active listener for better comprehension and retention
- Identify main points in spoken materials such as lectures, podcasts, and conversations

COURSE OUTCOMES:

CO 1: Deploy effective listening strategies in academic, technical and everyday situations **Remember**

CO 2: Engage in discussions expressing opinions and responding to ideas and arguments **Understand**

CO - PO MAPPING:

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

LIST OF EXPERIMENTS

1. Listening to Lectures: Structure and Emphasis – Note-making Techniques: capturing main ideas and details – Conversations, Dialogues and Identifying Opinions – Podcasts and Interviews – Active Listening Skills: Overcoming Barriers and Improving Focus
2. Listening for Specific Information: Facts, Figures, and Sequences – Global Accents: British, American, Australian – Following Instructions and Procedures: Task-based listening – Listening to Technical Explanations: Engineering Concepts – Short Writing Task: Summary or outline from technical input
3. Listening to Workplace Conversations: Meetings, Calls and Voice Notes – Listening to News & Current Events: Identifying Main Ideas and Recognizing – Colloquial Expressions and Idioms in Context: Enhancing comprehension of informal speech

CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 30 Periods

TEXTBOOKS:

1. Rob Freire and Tamara Jones, "Q: Skills for Success: Listening & Speaking", Level 4, 3rd edition, Oxford University Press, 2019
2. Ashraf M. Rizvi and Priyadarshi Patnaik, "Effective Technical Communication", 3rd Edition, McGraw Hill, 2024

REFERENCES:

1. Nixaly Leonardo, "Active Listening Techniques:30 Practical Tools to Hone Your Communication Skills", Embassy Books, 2022
2. Heather R. Younger, "The Art of Active Listening: How People at Work Feel Heard, Valued, and Understood", Berrett-Koehler Publishers, 2023

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SEMESTER II

U25MA204	Mathematical Transforms (Common to CE, CH, EE, ME, MI)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To understand Fourier analysis for periodic and aperiodic signals
- To apply Laplace transforms for solving linear ODEs with initial conditions
- To use Z-transforms for analyzing discrete – time systems

COURSE OUTCOMES:

CO 1: Understand and construct Fourier series representations of periodic functions, and apply them to solve basic signal analysis and engineering problems — **Understand**

CO 2: Apply Fourier transform techniques to analyze and interpret continuous-time signals in the frequency domain — **Apply**

CO 3: Compute Laplace transforms of standard functions and use them to model and analyze engineering systems involving differential equations — **Apply**

CO 4: Use inverse Laplace transforms and convolution theorem to solve ordinary differential equations with initial conditions in engineering applications — **Apply**

CO 5: Apply discrete-time systems using Z-transforms, and solve difference equations relevant to digital signal processing and control systems — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	2	-	-	-	-	-	-	-	-	-	1	1
CO 2	3	2	-	-	-	-	-	-	-	-	-	1	1
CO 3	3	2	-	-	-	-	-	-	-	-	-	1	1
CO 4	3	2	-	-	-	-	-	-	-	-	-	1	1
CO 5	2	2	-	2	1	-	-	-	-	-	-	1	1

SYLLABUS:

UNIT I: FOURIER SERIES — **6 + 6**

Dirichlet's conditions – General Fourier series – Even and odd functions – Half-range sine and cosine series – Parseval's identity

UNIT II: FOURIER TRANSFORM — **6 + 6**

Fourier transform pair – Sine and cosine transforms – Basic properties – Transforms of standard functions – Convolution theorem

UNIT III: LAPLACE TRANSFORM — **6 + 6**

Standard functions – Unit step and delta functions – Derivatives and integrals – Transform of periodic functions

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UNIT IV: INVERSE LAPLACE TRANSFORM **6 + 6**

Inverse Laplace methods – Convolution theorem – Solution of linear ODEs with constant coefficients

UNIT V: Z–TRANSFORM **6 + 6**

Z–transforms – Properties – Inverse Z-transform – Initial/final value theorems – Solution of difference equations

LIST OF EXPERIMENTS

1. Fourier Series – Fourier Series Approximation – Even/Odd Functions and Half-Range Expansions
2. Fourier Transforms – FFT and Spectral Analysis. – Convolution Theorem
3. Laplace Transforms – Laplace of Basic Functions – System Response Using Laplace
4. Inverse Laplace and ODE Solving – Inverse Laplace Transform – ODE Solving Using Laplace
5. Z-Transform Applications – Z-Transform and Sequence Analysis – Digital Filter Design and Stability

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th ed., Wiley India, 2018
2. Wylie C. R. & Barrett L. C., Advanced Engineering Mathematics, Tata McGraw-Hill, 2016
3. Grewal B. S., Higher Engineering Mathematics, 44th ed., Khanna Publishers, 2017

REFERENCES:

1. Andrews, L.C & Shivamoggi, B., Integral Transforms for Engineers, SPIE Press, 2016
2. Bali N. P. & Manish Goyal, Engineering Mathematics, 12th ed., Laxmi Publications, 2016
3. Peter V. O'Neil, Advanced Engineering Mathematics, Cengage, 2016
4. James G., Advanced Modern Engineering Mathematics, 3rd ed., Pearson, 2013

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SEMESTER II

U25PH205	Physics for Electrical and Electronics Engineering (Common to EE, MI)	Category: BSC				
		L	T	P	J	C
		2	0	0	2	3

COURSE OBJECTIVES:

- To understand the role of materials in electronics, solar energy, and thermoelectric applications
- To analyze the efficiency, stability, and challenges of photovoltaic and energy storage materials
- To explore emerging materials (2D, wide-bandgap semiconductors) and sensor technologies

COURSE OUTCOMES:

CO 1:	Understand the fundamentals of conductors, semiconductors, and insulators in electronic devices	**Understand**
CO 2:	Apply the knowledge of thermoelectric materials for energy harvesting applications	**Apply**
CO 3:	Compare Li-ion, solid-state, and supercapacitor materials for energy storage systems.	**Analyze**
CO 4:	Apply optoelectronic materials and emerging 2D materials for electronic device fabrication	**Apply**
CO 5:	Design sensor systems using piezoelectric, pyroelectric, and shape-memory materials	**Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	-	-	2
CO 2	3	2	1	1	-	-	-	-	-	-	-	-	2
CO 3	3	3	2	2	-	-	-	-	-	-	-	-	2
CO 4	3	2	1	1	-	-	-	-	-	-	-	2	-
CO 5	3	2	1	1	-	-	-	-	-	-	-	2	-

SYLLABUS:

UNIT I: MATERIALS FOR ELECTRONICS AND SOLAR ENERGY **6 + 6**

Basics of conductors, semiconductors, and insulators – Engineering materials: ceramics, polymers, and composites – Photovoltaics: Working of solar cells, types of materials (silicon-based, thin-film, organic, and perovskite solar cells) – Efficiency, stability, and material challenges in PV technology

UNIT II: MATERIALS FOR THERMOELECTRICITY **6 + 6**

Thermoelectric effects (Seebeck, Peltier, Thomson) – Thermoelectric figure of merit (ZT), and material properties (σ, S, κ) – Thermoelectric materials (Bi_2Te_3, PbTe, oxides) Applications – Waste heat recovery, cooling technologies – Hybrid vehicles

UNIT III: ENERGY STORAGE MATERIALS **6 + 6**

Energy storage systems for portable electronics and electric vehicles – Li-ion Batteries – Sodium-ion – potassium-ion – magnesium-ion-multivalent batteries – Solid-state batteries (ceramic & polymer electrolytes) – Supercapacitor materials (carbon-based, transition metal oxides, conducting polymers)

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UNIT IV: OPTOELECTRONIC AND EMERGING MATERIALS **6 + 6**

Transparent Conducting Oxides, Nonlinear Optics, LED, Photodetectors (Si, InGaAs), Emerging Materials & Applications – 2D materials (graphene, Transition Metal Dichalcogenides) for flexible electronics – Wide-bandgap semiconductors (SiC, GaN) for power devices

UNIT V: MATERIALS FOR SENSOR APPLICATIONS **6 + 6**

Principles of sensor operation – Inductance, capacitance, and resistance – Piezoelectric materials- pyroelectric materials, electroactive polymers, magneto-resistive and shape memory alloys – Applications of sensors in temperature, pressure, motion, and light detection

LIST OF PROJECTS

1. Design and Testing of a Mini Solar Cell Panel
2. Material Characterization of Photovoltaic Layers
3. Recycling Silicon Waste for Low-Cost Solar Panels
4. Fabrication of a Simple Thermoelectric Generator (TEG)
5. ZT Calculation of a Thermoelectric Material
6. Waste Heat Recovery System for Industrial Exhaust
7. Comparison of Li-ion and Na-ion Battery Performance
8. Development of a Solid-State Electrolyte
9. High-Capacitance Supercapacitor Using Carbon Nanomaterials
10. Fabrication of a Transparent Electrode Using ITO or Graphene
11. Design a Simple LED Circuit with Color-Tuning Capability
12. Photodetector Using 2D Material (Graphene or MoS_2)
13. Multifunctional Sensor Using Piezoelectric Material
14. Smart Glove with Embedded Sensors
15. Design of a Pyroelectric Motion Detector

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** 30 Periods **Total:** 60 Periods

TEXTBOOKS:

1. Safa Kasap, Principles of Electronic Materials and Devices, 4th Edition, McGraw-Hill Education, New Delhi 2018
2. N. M. Ravindra, Thermoelectrics: Fundamentals, Materials Selection, Properties, and Performance, ISBN 978-3-319-96339-6, Springer, 2019
3. Robert Huggins, Energy Storage: Fundamentals, Materials and Applications, ISBN: 9783319212395, Springer, 2016

REFERENCES:

1. J. Wilson and J. F. B. Hawkes, Optoelectronics: An Introduction to Materials and Devices, 3 edition, ISBN-13-978-9352866663, Pearson,2018
2. Jacob Fraden Handbook of Modern Sensors: Physics, Designs, and Applications" 5th Edition, Springer, 2016
3. https://onlinecourses.nptel.ac.in/noc21_mm03/preview

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Learn Beyond

SEMESTER II

U25CY201	Environmental Science and Sustainability (Common to all programmes)	Category: BSC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To provide the basic concepts of ecosystems, biodiversity, air and water systems and how to protect them
- To analyze the effects of human activities on the lithosphere, waste generation, and environmental health, and evaluate disaster management and technological solutions
- To apply the principles of sustainable living and green technologies in alignment with the UN Sustainable Development Goals

COURSE OUTCOMES:

CO 1: Utilize the ecosystem and biodiversity conservation concepts to address environmental issues **Apply**

CO 2: Implement atmospheric and hydrospheric concepts for water quality parameter determination. **Apply**

CO 3: Develop effective strategies to manage land-use challenges, agricultural issues, and waste management practices **Apply**

CO 4: Utilize technological tools to monitor environmental issues, resource recovery, and pollution control processes **Apply**

CO 5: Implement sustainable development strategies for green practices and waste management **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	-	2	1	1	-	1	-	1
CO 2	3	2	1	1	-	-	2	1	1	-	1	-	1
CO 3	3	2	1	1	-	-	2	1	1	-	1	-	1
CO 4	3	2	1	1	-	-	2	1	1	-	1	1	-
CO 5	3	2	1	1	-	-	2	1	1	-	1	-	1

SYLLABUS:

UNIT I: ENVIRONMENTAL SCIENCE AND BIODIVERSITY **3 + 6**

Ecosystems – Classification, Structure, Energy Flow, Ecological Succession – Biodiversity – Importance, Values and Levels – India as a Mega-diversity Nation – Red Data Book, Hotspots and Conservation of Biodiversity Self-Learning and Case Studies – Wildlife Crime in India (Poaching) – Man and Wildlife Conflict (e.g., Elephant-Human conflict in Odisha or Assam)

UNIT II: ATMOSPHERE AND HYDROSPHERE **3 + 6**

Atmosphere – Structure, Climatic Zones, Air Quality Standards (National & WHO), Air Pollution – Causes, effects, control measures, Carbon Emissions – Greenhouse Effect, Global Warming. Hydrosphere – Hydrological Cycle – Water Quality Parameters, water pollution – Causes, effects, control measures, Overutilization of Ground Water – Water Conservation Strategies, Microplastics as emerging pollutants-Causes, effects and control measures Self-Learning and Case Studies – Atmosphere – Urban air quality (Delhi, Beijing case), Hydrosphere – (National Water Mission (NAPCC), NRCP, Jal Shakti Abhiyan – Cape Town Water Crisis (2017–2018)

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UNIT III: LITHOSPHERE AND SOLID WASTE MANAGEMENT 3 + 6

Lithosphere – Composition, Plate tectonics, continental drift, Soil Nutrients, Nitrogen cycles, Soil Pollution – Causes, effects (Land degradation, desertification) and control measures, Agriculture – Problems of modern agriculture. E-waste-causes, effects and control measures. Solid Waste Management – Types & Sources of waste, waste management processes. Self-Learning and Case Studies - (Land degradation – Rajasthan - Soil erosion – Narmada River Basin, MP – Desertification – Thar Desert – Eco buddy program).

UNIT IV: GLOBAL ISSUES, HUMAN WELFARE AND ROLE OF TECHNOLOGY 3 + 6

Disasters & Disaster management cycle – Floods, Landslides, Land Clearing Projects – Dam sites, Highways projects. Resettlement and Rehabilitation (R&R). Population – Global and national growth patterns, Population explosion, Role of information Technology (IT) in Environmental studies and human health monitoring. Self-Learning and Case Studies – Use of IT in environmental monitoring (GIS, Remote Sensing, sensors, data loggers) Pollution Monitoring – Water, Air.

UNIT V: SUSTAINABLE DEVELOPMENT AND GREEN PRACTICES 3 + 6

Sustainable Development – Introduction, Concepts and Strategies, Sustainable Practices and Circular Economy – 5Rs, Zero Waste Lifestyle Sustainable Development – Introduction, Concepts and Strategies, Sustainable Practices and Circular Economy – 5Rs, Zero Waste Lifestyle. Sustainable Agriculture, Green Technologies – Green Chemistry and reagent in industries, Environmental Management – ISO 14001:2004, energy efficiency, sustainable transport, carbon sequestration. Self-Learning and Case Studies - Overview of United Nations SDGs (focus on SDGs 6, 7, 11, 12, 13), Role of India in implementing SDGs, Ambikapur, Chhattisgarh – Zero waste city model, Pune, Maharashtra – Integrating informal waste sector, Delhi Metro – Energy efficiency, carbon credits from regenerative braking, solar power use, Kochi, Kerala – Sustainable urban transport with water metro and public transit integration.

LIST OF EXPERIMENTS

1. Estimation of hardness (total, temporary, permanent) in water samples
2. Iodometric / Argentometric determination of available chlorine in a sample of bleaching powder.
3. Estimation of dissolved oxygen in water.
4. Determination of nitrate/ammonium estimation — colorimetric tests for nitrate/ammonium to study N availability
5. Recovery of Aluminum from waste materials.
6. Photocatalytic degradation of dye using TiO_2.
7. Synthesis of biodesel from vegetable oil.
8. Coir pith composting and application study.
9. Determination of conductivity, TDS and turbidity test for potable water

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. E. Bharucha, "Environmental Studies for Undergraduate Courses", 2nd edition, Hyderabad, University Press (India) Pvt. Ltd., 2005
2. R. Rajagopalan, "Environmental Studies: From Crisis to Cure", 3rd edition, New Delhi: Oxford University Press, 2016
3. A. Kaushik and C. P. Kaushik, "Environmental Science and Engineering" 5th edition, New Delhi: New Age International Publishers, 2019
4. R. R. Hiremath, "Sustainable Development", 1st edition, New Delhi: Himalaya Publishing House, 2008

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5. P. D.Sharma, "Ecology and Environment" 13th edition, Meerut: Rastogi Publications, 2020

REFERENCES:

1. P. Meenakshi, "Elements of Environmental Science and Engineering" 1st edition, New Delhi: Prentice Hall of India, 2005
2. G. R. Chatwal and Harish Sharma, "A Textbook of Environmental Studies" 3rd edition, Mumbai: Himalaya Publishing House, 2018
3. A. Kumar, "Environmental Studies", Revised edition, Patna: Bharati Bhawan Publishers & Distributors, 2019
4. V. Desai, "Environment and Sustainable Development" 1st edition, Mumbai: Himalaya Publishing House, 2009
5. G. K. Taneja, Gopal and S. C. Sharma, "Environmental Sustainability and Development", 2nd edition, New Delhi: Deep and Deep Publications, 2010

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SEMESTER II

U25CSG05	Computational Problem Solving using Python (Common to AD, AM, BM, CB, CS, EC, EE, IT, SC)	Category: ESC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To introduce the foundational concepts of Python programming
- To equip students with skills in functional and object-oriented programming
- To develop proficiency in core data structures and file handling techniques
- To enable learners to apply Python for real-world data analysis and visualization

COURSE OUTCOMES:

CO 1:	Understand basic Python syntax, data types, and debugging using script and interactive modes	**Understand**
CO 2:	Develop programs using conditionals, loops, functions, recursion, and apply appropriate variable scopes	**Apply**
CO 3:	Implement object-oriented concepts and manipulate Python collections using slicing, aliasing, and comprehension	**Apply**
CO 4:	Perform file operations, handle exceptions, and manage modules, packages, and dependencies in Python	**Apply**
CO 5:	Apply NumPy, Pandas, and visualization tools to perform data analysis and generate real-world insights	**Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	2	-	-	-	-	-	-	-	-	-	2	-
CO 2	3	2	1	1	-	-	-	-	-	-	2	2	-
CO 3	3	2	1	1	-	-	-	-	-	-	2	2	-
CO 4	3	2	1	1	-	-	-	-	-	-	2	2	-
CO 5	3	2	1	1	1	-	-	-	-	-	2	2	-

SYLLABUS:

UNIT I: PYTHON BASICS AND PROGRAMMING CONSTRUCTS **6 + 6**

Python interpreter – Script and interactive mode – Execution flow – Data types – Variables – Expressions – Statements – Operators – IO Operations – Comments – Error types – Debugging techniques – Basic IDE usage

UNIT II: CONTROL STRUCTURES AND FUNCTIONAL PROGRAMMING **6 + 6**

Conditional statements – Boolean logic – Loops – Function definition – Function arguments and its types – Return values – Scope – Recursion

UNIT III: CORE DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING **6 + 6**

Python Collections and Data Manipulation: String – List – Tuples – Set – Dictionary – Slicing, Mutability, Aliasing, Packing and unpacking – List comprehension. Classes and Object Oriented Programming (OOP) – Class definition – Constructors – Instance methods – Inheritance – Method overloading and overriding.

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UNIT IV: FILE HANDLING, EXCEPTIONS, AND MODULES **6 + 6**

Text and CSV file operations: File operations – Handling using with keyword. Exception handling: Try, Except, Else, Finally, Custom exceptions – Command line arguments using sys.argv – Modules, Packages and Virtual environments – Managing dependencies with PIP

UNIT V: DATA ANALYSIS AND VISUALISATION WITH COMPUTATIONAL THINKING **6 + 6**

NumPy: Slicing, Broadcasting and Vectorized Operations. Pandas: Series and Data frames – Reading and writing files – Data Filtering, Sorting, Grouping and Aggregation. Visualization: Matplotlib

LIST OF EXPERIMENTS

1. Demonstrating Python Programming Using Simple Statements and Expressions
2. Solving Problems Using Decision Making and Looping Constructs
3. Creating Programs Using Lists, Tuples, and Sets
4. Manipulating Data Using Dictionaries
5. Handling Exceptions and String Operations in Python
6. Implementing Programming Using User-Defined and Recursive Functions
7. Implementing Object-Oriented Programming Using Classes and Inheritance
8. Performing File Operations and Using Python Modules
9. Exploratory Data Analysis Using NumPy and Pandas
10. Data Visualization Using Matplotlib

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. Reema Thareja, "Python programming: Using problem solving approach", 1st Edition, Oxford Press, 2017
2. William McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, 2nd Edition, Shroff/O'Reilly Publication, 2017

REFERENCES:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
2. Ashok Namdev Kamthane and Amit Ashok Kamthane, "Programming and Problem Solving with Python", 2nd Edition, McGrawHill Education, 2018
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", 1st Edition, Pearson India Education Services Pvt. Ltd., 2016

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Learn Beyond

SEMESTER II

U25CEG01	Basics of Civil Engineering (Common to AD, AM, BM, CB, CS, EC, EE, IT, SC)	Category: ESC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To provide knowledge about different types of building materials
- To teach the difference between conventional and modern infrastructure systems

COURSE OUTCOMES:

CO 1:	Explain traditional and modern building materials, their properties, and applications	**Understand**
CO 2:	Describe substructure and superstructure components with their functions and construction methods	**Understand**
CO 3:	Discuss basic concepts of highways, railways, airways, and waterways	**Understand**
CO 4:	Explain BIM principles, green building concepts, and smart city planning	**Understand**
CO 5:	Describe sustainable practices in material selection, solid waste management, and eco-friendly construction	**Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	-	-	-	-	-	-	-	1	-	1
CO 2	3	2	1	-	-	-	-	-	-	-	1	-	1
CO 3	3	2	1	-	-	-	-	-	-	-	1	-	1
CO 4	3	2	1	-	-	-	-	-	-	-	1	-	1
CO 5	3	2	1	-	-	-	-	-	-	-	1	-	1

SYLLABUS:

UNIT I: BUILDING MATERIALS AND COMPONENTS **9 + 25**

Building Materials: Introduction – Bricks – Stones – Sand – Aggregate – Cement – Mortar – Concrete – Steel – Wood – Smart materials. Surveying: Objects – Classification – Sub Structures: Soil Classification – Bearing capacity – Foundation – Function – Requirements – Types of foundations – Super Structures: Brick masonry – Stone masonry – Beams – Columns – lintels – Roofing – Flooring – Plastering – Damp proofing – Weathering course

UNIT II: BASIC INFRASTRUCTURE AND TRANSPORTATION **6 + 5**

Introduction to Highways – Railways – Airways and Waterways – Building Information Modeling (BIM) – Solid waste management system – Concept of Green Building – Benefits of Green Buildings – Green Building Materials – Smart Cities

LIST OF EXPERIMENTS

1. Compressive Strength test on Bricks
2. Water absorption test on Bricks
3. Water absorption test on coarse aggregates
4. Impact Test on aggregates
5. Determination of Specific gravity of soil solids

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6. Study on Centre line marking for building components - Foundations

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. S K Duggal, "Building Materials", Sixth Edition, New Age International Publishers, 2025
2. Sharma. S.K, "Civil Engineering Construction Materials", Khanna Publishing House, New Delhi, 2024

REFERENCES:

1. K.K. Dwivedi and K.K. Shukla.," Basic Civil Engineering & Engineering Mechanics", Dhanpat rai & Co PVT Ltd., 2020
2. Subramanian K.P., "Highways, Railways, Airport and Harbour Engineering", 10th Edition, Scitech Publications (India), Chennai, 2018

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SEMESTER II

U25MEG02	Basics of Mechanical Engineering (Common to AD, AM, BM, CB, CE, CS, EC, EE, IT, SC)	Category: ESC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To provide the fundamental knowledge of mechanical elements, actuation systems, and manufacturing processes essential for engineering applications
- To develop an understanding of energy conversion, thermodynamics, heat transfer, fluid mechanics, and power generation systems for solving practical problems

COURSE OUTCOMES:

CO 1: Identify the mechanical elements and actuation systems used in basic engineering applications **Understand**

CO 2: Classify various manufacturing processes and distinguish between shaping, joining, and additive manufacturing methods **Understand**

CO 3: Interpret the concepts of thermodynamics, heat transfer, and fluid mechanics to practical engineering problems **Understand**

CO 4: Identify the various conventional and non-conventional methods of power generation **Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	1	-	1	1	-	-	-	-
CO 2	2	1	-	-	1	1	-	1	1	-	-	-	-
CO 3	2	1	-	-	-	-	-	1	1	-	-	-	1
CO 4	2	1	-	-	-	1	-	1	1	-	-	-	1

SYLLABUS:

UNIT I: MECHANICAL ELEMENTS AND ACTUATION SYSTEMS **3 + 8**

Mechanical elements – Gears, chains, shaft, keys, coupling, bolts, nuts, screws, spring, bearings – Actuators – Hydraulics actuators, pneumatics actuators

UNIT II: FUNDAMENTALS OF MANUFACTURING PROCESSES **4 + 4**

Introduction to manufacturing – Classification of manufacturing processes – Shaping processes – Casting, molding, powder metallurgy, additive manufacturing (FDM, SLA) – Joining processes – Arc welding, brazing and soldering

UNIT III: BASICS OF THERMAL AND FLUID SYSTEMS **4 + 12**

Basic thermodynamics concepts – System, surroundings, properties, state, process, cycle, laws of thermodynamics and its application – Heat transfer basics – Modes of heat transfer – Conduction, convection, and radiation (basic explanation with examples) – Properties of fluids – Density, specific gravity, viscosity, surface tension, capillarity – Pressure and measurements, pascal's law – Types of fluid flow – Introduction to pumps and its types

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UNIT IV: ENERGY CONVERSION SYSTEMS **4 + 6**

Introduction to IC and EC Engines – General layout and working of electric vehicle – Power plant – Working and types – Thermal power plant – Hydro power plant – Nuclear power plant – Gas power plant

LIST OF EXPERIMENTS

1. Determine the velocity ratio using simple and compound gear trains
2. Construct and demonstrate a basic pneumatic circuit using single-acting and double-acting cylinders
3. Demonstrate the working of 3D printer by printing a simple object
4. Determination of heat transfer coefficient under natural convection from vertical cylinder
5. Verification of Bernoulli's theorem
6. Performance characteristics of a centrifugal pump
7. Demonstration on IC engine components

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Pravin Kumar, "Basic Mechanical Engineering", 3rd Edition, Pearson Education India, 2018
2. H. S. Bawa, "Manufacturing Processes", Latest Edition, Tata McGraw-Hill Education, 2004

REFERENCES:

1. P. K. Nag, "Engineering Thermodynamics", 6th Edition, Tata McGraw Hill Education, 2017
2. Godfrey C. Onwubolu, "Mechatronics: Principles and Applications", 1st Edition, Elsevier, 2006
3. P. K. Nag, "Power Plant Engineering", 4th Edition, McGraw Hill Education, 2017

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SEMESTER II

U25EE201	Electric Circuit Analysis	Category: PCC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- U25EE101 - Electrical Engineering Disciplines and Skills

COURSE OBJECTIVES:

- To enable application of circuit laws, network theorems, and systematic analysis techniques for solving electrical networks under steady-state conditions
- To facilitate analysis of resonance, coupled circuits, transient responses, and two-port network parameters for electrical system characterization
- To develop the capability to analyze three-phase system behavior and power measurement techniques under balanced and unbalanced conditions

COURSE OUTCOMES:

CO 1: Apply circuit laws, network analysis techniques, and phasor concepts to analyze electrical circuits under steady-state conditions — **Apply**

CO 2: Apply network theorems such as Thevenin's, Norton's, Superposition, and Maximum Power Transfer to simplify and solve electrical networks — **Apply**

CO 3: Analyze resonance and coupled circuits to evaluate frequency response, bandwidth, and power characteristics — **Analyze**

CO 4: Analyze transient responses and two-port network parameters to evaluate circuit behavior under time-varying conditions — **Analyze**

CO 5: Analyze three-phase systems under balanced and unbalanced conditions and evaluate power measurement techniques — **Analyze**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	2	2	3	-	2	2	1	-	2	-	2
CO 2	3	3	2	2	3	-	2	2	1	-	2	-	2
CO 3	3	3	2	2	3	-	2	2	1	-	2	-	2
CO 4	3	3	2	2	3	-	2	2	1	-	2	-	2
CO 5	3	3	2	2	3	-	2	2	1	-	2	-	2

SYLLABUS:

UNIT I: CIRCUIT LAWS AND PRINCIPLES — **6 + 6**

Active and passive elements – Elements in series and parallel connections – Equivalent resistance – Ohm's law and Kirchhoff's laws – Network topology (qualitative) – Complex impedance – Phasor diagram – Mesh and nodal analysis – Power, power factor and energy

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UNIT II: NETWORK THEOREMS **6 + 6**

Voltage and current division – Star and delta conversions – Source transformation – Superposition theorem – Thevenin's and Norton's theorem – Maximum power transfer theorem – Millman's theorem

UNIT III: RESONANCE AND COUPLED CIRCUITS **6 + 6**

Series and parallel resonance circuits – Frequency response, quality factor bandwidth and half power frequencies – Coupled circuits – Self and mutual inductance – Coupling coefficient – Dot rule – Single tuned circuits

UNIT IV: TRANSIENT RESPONSE AND TWO PORT NETWORKS **6 + 6**

Transient response of RL, RC and RLC circuits with DC and sinusoidal excitations – Two port networks – Z, Y and H parameters

UNIT V: THREE PHASE CIRCUITS **6 + 6**

Three phase system – Phasor diagram – Three phase three wire – Three phase four wire – Balanced star and delta load – Unbalance star and delta load – Power measurement in three phase system

LIST OF EXPERIMENTS

1. Verification of Ohm's Law and Kirchhoff's Laws
2. Analysis of Mesh and Nodal Methods in Resistive Networks
3. Simulation of AC Circuits Using Phasors and Complex Impedance
4. Implementation and Verification of Star-Delta Conversion
5. Simulation and Verification of Superposition Theorem
6. Simulation of Thevenin's and Norton's Equivalent Circuits
7. Analysis of Maximum Power Transfer in Electrical Networks
8. Simulation of Balanced and Unbalanced Three-Phase Loads
9. Measurement of Power in Three-Phase Systems Using Two Wattmeter Method
10. Simulation of Transient Response in RL, RC, and RLC Circuits
11. Simulation and Analysis of Resonance in Series and Parallel RLC Circuits
12. Simulation of Mutual Inductance and Coupling Coefficient in Coupled Circuits

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. Sudhakar A and Shyam Mohan S. Palli, "Circuits and Network Analysis", 5th edition, McGraw-Hill Education, New Delhi, 2019
2. William H. Hayt, Jr., Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", 8th edition, McGraw-Hill Education, New Delhi, 2013

REFERENCES:

1. Joseph A. Edminister, Mahmood Nahvi, "Electric Circuits", 5th edition, Schaum's outline series, McGraw Hill Education, New Delhi, 2017
2. Allan H. Robbins, Wilhelm C. Miller, "Circuits Analysis Theory and Practice", 5th edition, Cengage Learning, India, 2013
3. Charles K. Alexander and Matthew N. O. Sadiku, "Electric Circuits", 6th edition, McGraw Hill Education, New Delhi, 2019

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SEMESTER II

U25MEG03	Engineering Graphics (Common to CE, CH, EC, EE, ME)	Category: ESC				
		L	T	P	J	C
		0	0	4	0	2

COURSE OBJECTIVES:

- To impart knowledge of BIS standards and conventions in engineering graphics for the accurate construction of curves, projections and developments
- To develop the ability to visualize and represent 3D objects in 2D space through orthographic projections, sectional views and development of surfaces
- To enhance the drafting skills to interconvert between isometric and orthographic views for practical engineering application using CAD Software

COURSE OUTCOMES:

CO 1: Illustrate engineering curves with BIS standards for effective engineering communication **Understand**

CO 2: Apply the principles of orthographic projection to represent points, straight lines, plane surfaces, and solids on engineering drawing sheets **Understand**

CO 3: Construct projections of truncated and frustums solids and develop the lateral surfaces of solids **Understand**

CO 4: Convert the isometric views of simple objects to orthographic views and vice versa **Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	-	-	-	-	2	1	2	-	2	-	-
CO 2	3	1	-	-	-	-	1	1	2	-	-	-	-
CO 3	3	1	-	-	2	-	-	1	2	-	-	-	-
CO 4	3	2	-	-	2	-	2	1	2	-	2	-	-

LIST OF EXPERIMENTS

1. Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. agency, parallelism, inclination and perpendicularity (Not for Exam)
2. Manual construction of ellipse, parabola, and hyperbola by eccentricity method
3. Construction of involute of square and circle by manual drafting
4. Projection of points in all four quadrants by manual drafting
5. Projection of lines inclined to both horizontal and vertical planes by manual drafting
6. Projection of planes inclined to both horizontal and vertical planes by manual drafting
7. Projection of solids inclined to one plane and parallel to other planes using AUTOCAD
8. Section of solids with base resting on HP using AUTOCAD
9. Development of lateral surfaces of solids with base on HP using AutoCAD
10. Construction of isometric views of simple and truncated solids using AutoCAD
11. Sketching orthographic views from pictorial representation of 3D objects using AutoCAD

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CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** 60 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. N.D. Bhatt and V.M. Panchal, "Engineering Drawing", Charotar Publishing House, Gujarat, 55th edition, 2025
2. K. Venugopal and V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 2022
3. D.M.Kulkarni, A.P.Rastogi and A.K.Sarkar, "Engineering Graphics with AutoCAD", PHI Learning Private Limited, New Delhi, Revised Edition, 2021

REFERENCES:

1. K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2017
2. Sam Tickoo, "AutoCAD 2024 for Engineers and Designers", Dreamtech Press, 2024

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SEMESTER II

U25LEG05	German for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

CO 1: Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases — **Remember**

CO 2: Describe people, homes, weather, and daily routines using structured sentences with correct grammar — **Understand**

CO 3: Read and interpret simple texts such as product labels, menus, signs, and weather updates — **Understand**

CO 4: Write short messages or descriptions related to everyday topics like hobbies, weather, or family — **Understand**

CO 5: Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: EVERYDAY SHOPPING AND DINING — **6 + 3**

Shopping for groceries and clothes – Ordering food and drinks at a restaurant – Talking about prices and quantities – Expressing preferences – Reading menus, labels, and receipts – Grammar: Accusative case review with articles and adjectives, Plural forms of nouns, Adjective endings in nominative and accusative – Cultural Focus: Eating habits in Germany, Austria, and Switzerland – Supermarket etiquette – Restaurant culture – Tipping practices

UNIT II: PEOPLE AND PERSONAL INTERESTS — **6 + 3**

Talking about family and relationships – Describing people's appearance and personality – Hobbies and free time activities – Likes and dislikes – Grammar: Possessive pronouns - Adjective endings with possessive pronouns – Word order in main clauses – Cultural Focus: Family structures – Popular hobbies and sports – Work-life balance in German-speaking countries

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UNIT III: HOME AND LIVING 6 + 3

Describing your home and rooms – Furniture and household items – Talking about home layout and comfort – Grammar: Two-way prepositions with accusative/dative – Use of es gibt – Describing location vs. movement – Cultural Focus: Typical German homes – Living arrangements – Interior design norms

UNIT IV: SEASONS AND WEATHER 6 + 3

Talking about weather and seasons – Seasonal activities – Preferences for seasons – Grammar: Temporal phrases – Review of present tense verb usage with seasonal context – Use of weil (because) – Cultural Focus: Seasonal festivals like Weihnachten and Oktoberfest – Weather patterns in German speaking countries

UNIT V: PUTTING IT TOGETHER – DAILY LIFE 6 + 3

Combining shopping – Personal life – Home, and seasonal activities into daily routines – Conversational practice across units – Grammar: Practice of main and subordinate clauses – Sentence structure review – Verb position with weil and prepositions – Cultural Focus: Daily routines in Germany – Overview of regional variations in culture and habits

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Buscha, A., & Szita, S., "Begegnungen Deutsch als Fremdsprache A1+: Integriertes Kurs- und Arbeitsbuch," 1st Edition, 2021
2. Brüseke, R., "Grammatik leicht A1," 1st Edition, 2019

REFERENCES:

1. Netzwerk Deutsch als Fremdsprache A1, 1st Edition: BlueNBells, 2012
2. Huber, K., & Keller, F., "DaF kompakt A1: Deutsch als Fremdsprache," 3rd Edition, Langenscheidt, 2018

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Learn Beyond

SEMESTER II

U25LEG06	Japanese for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

CO 1: Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases — **Remember**

CO 2: Describe people, homes, weather, and daily routines using structured sentences with correct grammar — **Understand**

CO 3: Read and interpret simple texts such as product labels, menus, signs, and weather updates — **Understand**

CO 4: Write short messages or descriptions related to everyday topics like hobbies, weather, or family — **Understand**

CO 5: Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: SHOPPING AND QUANTITIES — **6 + 3**

Shopping-related expressions – Asking prices and quantities – Counting objects with counters: ～つ, ～人, ～枚, ～本 – Describing wants using ～がほしいです – Offering and requesting using ～をください – Grammar: Verbs in -masu form (かいます, かります, あげます, もらいます) – Particles: と, や, から, まで – Sentence structures: ～があります / ～がいます, ～は～にあります – Vocabulary: Money, items, colors, shops – Kanji: Numbers (一～十), Days (日, 月, 火) – Basic shopping terms – Cultural note: Japanese currency – Store etiquette – Giving/receiving customs

UNIT II: DAILY LIFE AND TIME EXPRESSIONS — **6 + 3**

Talking about schedules and habits – Expressing future plans using time expressions and verb tense – Grammar: Verb conjugation (non-past affirmative/negative) – Introduction to te-form: ～てください, ～てもいいです – Sequence with ～てから – Frequency expressions: ～まいにち, ～ときどき, ～よく – Vocabulary: School/work schedule, leisure activities, public places, transportation – Kanji: Days of the week (月, 火, 水, 木, 金, 土, 日) – Time-related (時, 分, 半) – Motion verbs (行く, 来る, 帰る) – Cultural note: Japanese daily routines – Work-life balance, punctuality

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UNIT III: MAKING REQUESTS AND SEQUENCING ACTIONS 6 + 3

Talking about likes and dislikes: ～がすきです / ～がきらいです – Describing abilities: ～がじょうずです / ～がへたです – Vocabulary: Hobbies, sports, entertainment terms – Inviting someone using ～ませんか – Accepting or declining invitations: いいですね / ちょっと – Grammar: Verb forms for expressing preference and intention – Particle: が for subject in expressions of ability and preference – Kanji: Verbs related to hobbies (見, 聞, 読, 書, 食) – Nouns related to interests – Cultural note: Popular hobbies in Japan – Seasonal pastimes – Communication norms in social invitations

UNIT IV: HOBBIES AND PREFERENCES 6 + 3

Asking and giving directions – Describing locations of people and things – Using maps and signs – Grammar: Particles に and で for location and direction – Expressions: ～のまえに, ～のとなりに, ～のなかに – Vocabulary: Places in town – Transportation terms – Directional phrases – Kanji: Location and place words (駅, 右, 左, 上, 下, 中) – Common public signs – Cultural note: Navigating Japanese cities – Polite phrases for asking directions – Public transport norms

UNIT V: ABILITIES AND SOCIAL INTERACTIONS 6 + 3

Review of shopping – Preferences, routines, and directions – Roleplays: at the store, planning a weekend – Inviting a friend – Asking for help and giving opinions – Grammar: Integrated use of learned verb forms and particles – Vocabulary: Reinforcement through conversation – Kanji: Mixed use in real-life contexts – Cultural note: Everyday conversation etiquette – Blending formal and informal speech – Real-life scenarios in Japan

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. 3A Corporation, "Minna no Nihongo Shokyū I: Main Textbook," 2nd Indian Edition, Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2018
2. Banno, Eri, Yutaka Ohno, Yoko Sakane, Chikako Shinagawa, and Kyoko Tokashiki, "Genki I: An Integrated Course in Elementary Japanese," 3rd Edition, The Japan Times Publishing, Tokyo, 2020

REFERENCES:

1. Yamada, M., & Fujita, T., "Japanese for Beginners: A Practical Approach," 1st Edition, Tuttle Publishing, 2019
2. Takahashi, A., & Sato, M., "Nihongo Pro: Japanese for N5 Level," 1st Edition, KADOKAWA, 2018

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SEMESTER II

U25LEG07	French for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

CO 1: Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases — **Remember**

CO 2: Describe people, homes, weather, and daily routines using structured sentences with correct grammar — **Understand**

CO 3: Read and interpret simple texts such as product labels, menus, signs, and weather updates — **Understand**

CO 4: Write short messages or descriptions related to everyday topics like hobbies, weather, or family — **Understand**

CO 5: Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: FOOD AND SHOPPING ESSENTIALS — **6 + 3**

Food items – Quantities – Packaging – Prices – Navigating markets and stores – Asking for prices and quantities – Expressing preferences and choices – Grammar: Partitive articles (du - de la - des) – Expressions of quantity (un kilo de - beaucoup de - etc.) – Use of il y a – Verb prendre (to take) – Vouloir (to want) – Acheter (to buy) in the present tense – Cultural Focus: French culinary culture – Market etiquette – Typical meals and menus

UNIT II: DINING OUT AND CAFÉ CULTURE — **6 + 3**

Ordering in a café or restaurant – Understanding menus – Making polite requests – Expressing likes and dislikes – Talking about meals – Grammar: Adjective placement and agreement with nouns – Review of present tense verbs – Questions and polite forms – Cultural Focus: Café culture in France and Francophone regions – Dining customs – Tipping practices

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UNIT III: DESCRIBING HOME AND SURROUNDINGS

6 + 3

Talking about where you live – Describing your home and rooms – Locating objects in a room – Discussing furniture and appliances – Grammar: Prepositions of place (sur - sous - devant - derrière - entre) – Demonstrative adjectives (ce - cette - ces) – Verb habiter and other -er verbs – Cultural Focus: Types of housing in France – Apartment etiquette – Real estate ads in Francophone cities

UNIT IV: DAILY ROUTINES AND PERSONAL DESCRIPTIONS

6 + 3

Describing people – Talking about daily routines – Introduction to reflexive verbs – Using adverbs of place (ici - là-bas) – Giving simple directions – Grammar: Reflexive verbs (s'habiller, se lever) – Adverbs of place – Review of verb placement – Cultural Focus: Urban vs. rural living – Typical neighborhood life in French cities

UNIT V: LEISURE, WEATHER, AND SOCIAL LIFE

6 + 3

Talking about hobbies and sports – Weekend activities – Making and responding to invitations – Expressing preferences and future intentions – Grammar: Verbs faire, aimer, préférer, sortir, aller – Contractions with à and de (au, du) – Near future tense (futur proche: aller + infinitive) – Use of on – Cultural Focus: Leisure activities in Francophone countries – Popular sports and pastimes – Social norms around outings and gatherings

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Marie-José Lopes & Jean-Thierry Bougnec, "Inspire 2 A1-A2 Méthode de français," 1st Edition, Hachette Français Langue Etrangère, 2020
2. Gibbe, C., Berthet, A., & Hugot, C., "Édito A2: Méthode de français," 1st Edition, Didier, 2024

REFERENCES:

1. Chantal Fougères & Marc de la Harpe, "Le Nouveau Sans Frontières 2: Méthode de français A2," 1st Edition, Hachette FLE, 2020
2. Xavier Maingueneau, "Le Français pour les Nuls: A2-B1," 3rd Edition, Wiley, 2021

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SEMESTER II

U25LEG08	Hindi for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

CO 1: Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases — **Remember**

CO 2: Describe people, homes, weather, and daily routines using structured sentences with correct grammar — **Understand**

CO 3: Read and interpret simple texts such as product labels, menus, signs, and weather updates — **Understand**

CO 4: Write short messages or descriptions related to everyday topics like hobbies, weather, or family — **Understand**

CO 5: Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: SHOPPING LANGUAGE AND NUMBER USAGE — **6 + 3**

Interacting in markets and shops – Asking prices and quantities – Expressing need and preference – Vocabulary: Fruits – Vegetables – clothes – Money terms – Numbers (1–100) – Classifiers: किलो - दर्जन – Use of polite requests – Grammar: Verbs चाहना - लेना -देना in present tense – Use of कुछ and कितना – Postpositions: के लिए - के पास – Emphatic words: ही - भी – Cultural note: Indian market etiquette – Bargaining norms – Respectful phrases for shopkeepers – Currency handling

UNIT II: DESCRIBING PEOPLE AND RELATIONSHIPS — **6 + 3**

Talking about family and people – Describing physical appearance and personality – Expressing family relations – Vocabulary: Family members – Descriptive adjectives – Colors – Body parts – Grammar: Adjective agreement by gender and number – Possessives with का/की/के – Verb होना in past tense (था/थी/थे) – Using का रिश्ता for relationships – Honorific subject-verb agreement – Cultural note: Kinship terms – Family address norms – Formal/informal differences – Indian respect systems

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UNIT III: HOBBIES, LIKES, AND SOCIAL LANGUAGE

6 + 3

Talking about hobbies and free time – Expressing likes and dislikes – Making suggestions and invitations – Vocabulary: Leisure activities – hobbies - entertainment words – Days of the week – Grammar: पसंद होना constructions – Compound verb use with करना (e.g., किताब पढ़ना) – Use of मुझे X पसंद है – Use of को for preferences – Future tense basics with गा/गी/गे – Cultural note: Indian leisure culture – Film and music – Inviting friends – Group social etiquette

UNIT IV: EVERYDAY CONVERSATIONS AND NEEDS

6 + 3

Describing needs and routines in daily life – Making polite offers and requests – Talking about simple problems and solutions – Vocabulary: Basic needs – Services – Tools – simple household and health terms – Grammar: Requests with क्या आप...? – Use of चाहिए – Conditional phrases with अगर (if) – More on present vs. future tense use – Cultural note: Navigating services in India – Polite refusals – Help seeking expressions

UNIT V: RECAP AND REAL-LIFE PRACTICE

6 + 3

Conversational roleplays: shopping – Family introductions – Hobby discussion – Describing routines and asking for help – Combining sentence structures from previous units – Vocabulary: Review and integrate all learned sets – Grammar: Review of verb tenses – Guestion structures – Postpositions – Honorifics – Cultural note: Integrating cultural etiquette with language use – Real-world scenarios for communication in Hindi

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Pavithra Publications, "Spoken Hindi: Through Tamil," 2nd Edition, Pavithra Publications, Chennai, 2015
2. Dakshina Bharat Hindi Prachar Sabha, "Prathamic Text Book: New Syllabus," 1st Edition, Dakshina Bharat Hindi Prachar Sabha, Madras, 2023

REFERENCES:

1. Ganga, K., & Ramesh, V., "Learn Hindi in 30 Days: A Beginner's Guide," 3rd Edition, Hindi Academy, 2020
2. Vyas, S., "Spoken Hindi for Beginners," 1st Edition, Orient BlackSwan, 2018

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SEMESTER II

U25LEG10	Chinese for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

CO 1: Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases — **Remember**

CO 2: Describe people, homes, weather, and daily routines using structured sentences with correct grammar — **Understand**

CO 3: Read and interpret simple texts such as product labels, menus, signs, and weather updates — **Understand**

CO 4: Write short messages or descriptions related to everyday topics like hobbies, weather, or family — **Understand**

CO 5: Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: WOULD YOU LIKE TO HAVE COFFEE OR TEA? — **6 + 3**

Learning transposed objects – Learning how to express "too", "also" with 也 – Learning how to express "excessively" with 太.....了 – Learning numerical system in Chinese – Learning how to express "more than" with 多

UNIT II: WHERE IS MY WALLET? — **6 + 3**

Learning 在 as a verb with a place word – Learning location of an action (S + 在 + 處所詞 (PW) + 動作 (V)) – Learning how to express suggestion with 吧 – Learning noun + directional word as a place word – Learning existential sentences with 有

UNIT III: LET'S PLAY TENNIS THIS WEEKEND! — **6 + 3**

Learning how to express acquired skills with 會 (know how to) – Learning complement marker 得– Learning 有(一)點(兒) as an adverb – Learning auxiliary verb 可以

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UNIT IV: HOW MUCH IS THIS? **6 + 3**

Learning new vocabulary for shopping – Learning measure words (個, 本, 張, 件) – Learning how to ask and answer about prices (多少錢).Using 塊, 毛, 分 for money – Practicing shopping dialogues

UNIT V: WHAT'S YOUR FAVORITE FOOD? **6 + 3**

Learning new vocabulary for food and drinks – Learning common verbs for eating and drinking (吃, 喝) – Expressing preferences with 喜歡 / 不喜歡 – Using 還是 to make choices – Role-play: ordering food in a restaurant

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 15 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Mandarin Training Centre, National Taiwan Normal University, Modern Chinese I時代華語 I, Edited by Chih-Ping Chou, Taipei: Cheng Chung Book Company Ltd., 2019
2. Huayu101 / 華語101, Taiwan Ministry of Education, Taiwan Mandarin Educational Resources Centre, 2018

REFERENCES:

1. Cheng Chung Book Company Ltd, 時代華語 I 教師手冊 [Modern Chinese I Teacher's Manual, 2019
2. www.lmit edu.tw/bag

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Learn Beyond

SEMESTER II

U25MCC06	Universal Human Values II (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		2	1	0	0	3

PRE-REQUISITES:

- U25MCC01 - Universal Human Values I

COURSE OBJECTIVES:

- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature

COURSE OUTCOMES:

CO 1: Evaluate the significance of value inputs in formal education and start applying them in their life and profession **Understand**

CO 2: Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc **Understand**

CO 3: Analyze the value of harmonious relationship based on trust and respect in their life and profession **Understand**

CO 4: Examine the role of a human being in ensuring harmony in society and nature **Understand**

CO 5: Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession **Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: INTRODUCTION-BASIC HUMAN ASPIRATION, ITS FULFILLMENT THROUGH ALL ENCOMPASSING RESOLUTION **6 + 3**

The basic human aspirations and their fulfillment through Right understanding and Resolution – Right understanding and Resolution as the activities of the Self-self being central to Human Existence – All encompassing Resolution for a Human Being – Its details and solution of problems in the light of Resolution

UNIT II: RIGHT UNDERSTANDING - KNOWER, KNOWN & THE PROCESS **6 + 3**

The domain of right understanding starting from understanding the human being and extending up to understanding nature/ existence – its interconnectedness and co-existence – and finally understanding the role of human being in existence (human conduct)

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UNIT III: UNDERSTANDING HUMAN BEING **6 + 3**

Understanding the human being comprehensively as the first step and the core theme of this course – Human being as co-existence of the self and the body – The activities and potentialities of the self-basis for harmony/contradiction in the self

UNIT IV: UNDERSTANDING NATURE AND EXISTENCE **6 + 3**

A comprehensive understanding about the existence – Nature being included – The need and process of inner evolution – Particularly awakening to activities of the Self: Realization – Understanding and Contemplation in the Self

UNIT V: UNDERSTANDING HUMAN CONDUCT, ALL-ENCOMPASSING RESOLUTION & HOLISTIC WAY OF LIVING **6 + 3**

Understanding Human Conduct – Different aspects of all encompassing Resolution – Holistic way of living for Human Being with all encompassing resolution covering all four dimensions of human endeavor viz., realization, thought, behavior and work leading to harmony at all levels from Self to Nature and entire Existence

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** 15 Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019

REFERENCES:

1. E G Seebauer & Robert L. Berry, Fundamentals of Ethics for Scientists &Engineers, Oxford University Press, 2000
2. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
3. B P Banerjee, Foundations of Ethics and Management, Excel Books, 2005
4. B L Bajpai, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008

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SEMESTER II

U25MCC07	Tamils and Technology (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	0	0	1

COURSE OBJECTIVES:

- To learn weaving, ceramic and construction technology of Tamils
- To understand the agriculture, irrigation and manufacturing technology of Tamils
- To realize the development of scientific Tamil and Tamil computing

COURSE OUTCOMES:

CO 1:	Understand the weaving and ceramic technology of ancient Tamil people nature	**Understand**
CO 2:	Understand the construction technology, building materials in Sangam period and case studies	**Understand**
CO 3:	Infer the metal process, coin and beads manufacturing with relevant archeological evidence	**Understand**
CO 4:	Realize the agriculture methods, irrigation technology and pearl diving	**Understand**
CO 5:	Apply the knowledge of scientific Tamil and Tamil computing	**Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 2	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 3	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 4	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 5	-	-	-	-	-	-	3	3	-	2	-	-	-

SYLLABUS:

UNIT I: WEAVING AND CERAMIC TECHNOLOGY 3

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

UNIT II: DESIGN AND CONSTRUCTION TECHNOLOGY 3

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

UNIT III: MANUFACTURING TECHNOLOGY 3

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

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UNIT IV: AGRICULTURE AND IRRIGATION TECHNOLOGY 3

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

UNIT V: SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil – The role of journals in the development of scientific Tamil – Scientific Tamil vocabulary – Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 15 Periods

TEXTBOOKS:

1. Tamils and Technology, K. Jayanthi Ravikrishna, Sri Krishna publications, Mahalakshmi Nagar, Velappanchavadi, Chennai – 600 007, First Edition 2023
2. Tamils and Technology, S. Priyadharshini, V. K. Publications, 55, Gopuram Colony, Sivakasi – 626 124

REFERENCES:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை, International Institute of Tamil Studies, C.P.T Campus, Chennai
2. கணினித் தமிழ் - முனைவர். இல. சுந்தரம், விகடன் பிரசுரம், அண்ணா சாலை, சென்னை, திசம்பர் 2016
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, தமிழ்நாடு அரசு, சென்னை, ஆறாம் பதிப்பு 2020
4. The Contributions of the Tamils to Indian Culture, Dr. M. Valarmathi, International Institute of Tamil Studies, C.I.T Campus, Tharamani, Chennai, First Edition 1995
5. Studies in the History of India with Special Reference to Tamil Nadu, Dr. K. K. Pillay, 1979

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Learn Beyond

SEMESTER III

U25MA302	Probability and Statistics (Common to BM, CE, CH, EC, EE, ME, MI)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- U25MA101 - Calculus and Differential Equations / U25RMA101 - Multivariable Calculus and Applications

COURSE OBJECTIVES:

- To introduce the fundamental concepts of probability and statistics relevant to engineering
- To facilitate with students, use their understanding of statistical methods for data analysis and inference in their areas of study
- To develop probabilistic models to handle uncertainty and charts to check for quality control in engineering systems

COURSE OUTCOMES:

CO 1: Explain the fundamental concepts of probability and examine discrete probability distributions — **Understand**

CO 2: Apply suitable continuous distributions, such as uniform, exponential and normal to interpret and analyse statistical data — **Apply**

CO 3: Calculate and evaluate covariance and correlation to examine the relationship between two random variables using pairs of random variables — **Apply**

CO 4: Determine the estimation theory of parameters, testing of hypotheses for means and apply the Chi-square test for attribute independence — **Apply**

CO 5: Perform analysis of variances to compare the means of multiple samples and apply control charts to check for quality control — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	1	-	-	-	-	-	-	1	-
CO 2	3	2	-	-	2	-	-	-	-	-	-	1	-
CO 3	3	2	-	-	2	-	-	-	-	-	-	1	-
CO 4	3	2	-	-	2	-	-	-	-	-	-	1	-
CO 5	3	2	-	-	2	-	-	-	-	-	-	1	-

SYLLABUS:

UNIT I: ONE-DIMENSIONAL DISCRETE RANDOM VARIABLES — **6 + 6**

Probability – Conditional probability, independence – Baye's theorem – Discrete random variables, probability mass functions – Cumulative distribution functions – Mean and variance – Binomial, Poisson and geometric distributions

UNIT II: ONE-DIMENSIONAL CONTINUOUS RANDOM VARIABLES — **6 + 6**

Continuous random variables – Probability density functions – Cumulative distribution functions – Mean and variance – Uniform, exponential, normal distributions

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UNIT III: TWO-DIMENSIONAL PROBABILITY DISTRIBUTIONS 6 + 6

Two dimensional discrete and continuous random variables – Marginal probability distributions – Independence – Covariance – Correlation

UNIT IV: INFERENTIAL STATISTICS 6 + 6

Estimation - Point estimation – Interval estimation – Hypothesis testing – Hypotheses concerning means – Large, small samples - Chi square test for independence of attributes

UNIT V: ANOVA AND STATISTICAL QUALITY CONTROL 6 + 6

Analysis of variance – Completely randomized designs – Randomized block designs – Control charts for measurements ($\bar{X}$, R charts) – Control charts for attributes (p, np)

LIST OF EXPERIMENTS

1. One-Dimensional Discrete Random Variables – Mean and Variance of discrete RVs. – Discrete Probability distributions
2. One-Dimensional Continuous Random Variables – Mean and Variance of Continuous RVs. – Continuous Probability distributions
3. Two- Dimensional Probability Distributions – Marginal Probability distributions – Covariance and Correlation
4. Inferential Statistics – Estimation theory – Testing of hypotheses
5. ANOVA and SQC – Analysis of Variance. – Control charts ($\bar{X}$, R, p, np)

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", Wiley, 2018
2. Richard A. Johnson, "Miller & Freund's Probability and Statistics for Engineers", Pearson Education, New Delhi, 2017

REFERENCES:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, "Probability & Statistics for Engineers & Scientists, Pearson Education, New Delhi, 2016
2. Jay L. Devore, "Probability and Statistics for Engineering and the Sciences", Cengage Learning, NewDelhi 2020
3. Sheldon M Ross, "Introduction to Probability and Statistics for Engineers and Scientists", Academic press, USA, 2020
4. Robert V. Hogg, Elliot Tanis and Dale Zimmerman, "Probability and Statistical Inference", Pearson Education, USA, 2014

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SEMESTER III

U25EE301	Electromagnetic Theory and Applications	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

PRE-REQUISITES:

- U25MA101 - Calculus and Differential Equations / U25RMA101 - Multivariable Calculus and Applications

COURSE OBJECTIVES:

- To introduce the fundamental mathematical concepts and vector analysis used in electromagnetic field theory
- To provide knowledge of electrostatic and magnetostatic fields and their governing laws
- To explain Maxwell's equations and the applications of electromagnetic fields in electrical engineering systems

COURSE OUTCOMES:

CO 1:	Apply vector calculus and coordinate systems to solve electromagnetic field problems	**Apply**
CO 2:	Deploy Coulomb's law and Gauss's law to determine electrostatic field distributions	**Apply**
CO 3:	Implement electric potential concepts and field equations such as Laplace's equation and Poisson's equation to calculate capacitance and energy in electrostatic fields	**Apply**
CO 4:	Use Biot–Savart law and Ampere's circuital law to determine magnetic field intensity, magnetic forces and inductance	**Apply**
CO 5:	Analyze electromagnetic field behavior using Maxwell's equations and explain their applications in electromagnetic interference and electrical engineering systems	**Analyze**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	2	-	-	-	-	-	-	-	1	-	2
CO 2	3	3	2	1	-	-	-	-	-	-	1	-	2
CO 3	3	3	2	1	-	-	-	-	-	-	1	-	2
CO 4	3	3	2	1	-	-	-	-	-	-	1	-	2
CO 5	3	2	2	1	1	-	1	-	-	-	1	-	2

SYLLABUS:

UNIT I: CO-ORDINATE SYSTEMS **9**

Sources and effects of electromagnetics – Co-ordinate system: Rectangular, Cylindrical, Spherical – Differential elements – Point and vector transformation – Divergence theorem and Stoke's theorem

UNIT II: ELECTROSTATICS **9**

Coulomb's Law – Principle of superposition – Electric field intensity due to discrete charges – Electric field due to continuous uniform charge distribution: infinite and finite line, circular disc – Electric flux density – Gauss's Law

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UNIT III: ELECTRIC POTENTIAL 9

Electric potential – Potential due to infinite line charge, circular disc – Electric potential due to dipole moment – Polarization – Potential gradient – Equipotential surface – Continuity equation – Capacitance: parallel plate, sphere – Laplace's and Poisson's equation – Boundary conditions – Energy and energy density – Capacitive sensors and high-voltage systems

UNIT IV: MAGNETOSTATICS 9

Lorentz force equation – Force on current element – Force on parallel conductor – Biot-Savart's Law – Magnetic field intensity – Finite and infinite, circular loop – Ampere's circuital law – Magnetic flux density – Dipole moment – Torque – Boundary conditions – Inductance of solenoid and Toroid – Energy and energy density – Wireless charging systems

UNIT V: APPLICATION OF ELECTROMAGNETICS 9

Maxwell's equations – Poynting theorem – Electromagnetic interference: sources, coupling mechanisms, shielding, grounding, filtering – Electromagnetic compatibility: testing and mitigation – Protection – Safer limits of various induced potentials

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Mathew N.O. Sadiku, Kulkarni S. V, "Principles of Electromagnetic Fields", 6th edition, Oxford University Press, 2015
2. William Hayt, Jr. John A. Buck, Jaleel Akhtar M,"Engineering Electromagnetics", 9th edition, TMH publishing Co. Ltd., 2020

REFERENCES:

1. Joseph.A. Edminister, "Schaum's Outline Series Theory and Problems of Electromagnetics", 5th edition, Tata McGraw Hill, 2017
2. Ghosh S and Lipika Datta, "Electromagnetic Field Theory", 1st edition, Tata McGraw Hill, 2017

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SEMESTER III

U25EE302	Electrical Machines I	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

PRE-REQUISITES:

- U25EE201 - Electric Circuit Analysis / U25REE201 - Electric Circuit Analysis

COURSE OBJECTIVES:

- To develop a foundational understanding of the construction and operating principles of DC machines and transformers
- To build analytical competence in examining the characteristics and performance of DC machines and transformers
- To foster the ability to select appropriate DC machines and transformers for industrial and domestic applications

COURSE OUTCOMES:

CO 1: Analyze magnetic circuits and electromechanical energy conversion principles to determine EMF and torque — **Analyze**

CO 2: Investigate the construction, operation and characteristics of DC generators for practical applications — **Analyze**

CO 3: Apply the operating principles, characteristics and control methods of DC motors in engineering applications — **Apply**

CO 4: Examine the performance of single-phase transformers using losses, efficiency and voltage regulation — **Analyze**

CO 5: Apply transformer connections and testing methods to evaluate the performance of three-phase transformers — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	2	1	-	-	-	-	-	-	2	-	3
CO 2	3	3	2	1	-	-	-	-	-	-	2	-	3
CO 3	3	2	1	-	-	-	-	-	-	-	2	-	3
CO 4	3	3	2	1	-	-	-	-	-	-	2	-	3
CO 5	3	2	1	-	-	-	-	-	-	-	2	-	3

SYLLABUS:

UNIT I: ELECTROMECHANICAL ENERGY CONVERSION — **9**

Fundamentals of Magnetic circuits – Statically and dynamically induced EMF – Principles of electromechanical energy conversion – Singly excited and multi excited magnetic field systems – Faraday's law of electromagnetic induction – Torque production in rotating machines

UNIT II: DC GENERATORS — **9**

Construction of DC Machines – Principle of operation, EMF equation, types and characteristics of DC Generators – Commutation – Armature reaction – Parallel operation – Applications

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UNIT III: DC MOTORS 9

Principle of operation – Back EMF – Torque equation – Types and characteristics – Industrial and domestic applications – Starting and Speed Control – Testing of DC Machines

UNIT IV: SINGLE PHASE TRANSFORMERS 9

Construction – Principle of operation – EMF equation – Types – Equivalent circuit– Losses and efficiency – All day efficiency – Separation of core losses – Voltage regulation – Applications

UNIT V: THREE PHASE TRANSFORMERS 9

Construction – Types of connections – Scott connection – Applications of Scott connection – Parallel operation of transformers –Testing of transformers – Auto transformer

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. P. S. Bimbhra, "Electric Machinery", Khanna Publishers, 2nd Edition, 2021
2. I.J. Nagrath, D.P. Kothari, "Electric Machine", 5th Edition, McGraw-Hill Education, 2017

REFERENCES:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 6th Edition 2017
2. Stephen J. Chapman, "Electric Machinery and Power System Fundamentals", 5th Edition, McGraw–Hill Education, 2022
3. P.C. Sen, "Principles of Electric Machines and Power Electronics", 3rd Edition, John Wiley & Sons Inc, 2013

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SEMESTER III

U25EE303	Analog Electronics and Applications	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

PRE-REQUISITES:

- U25EE201 - Electric Circuit Analysis / U25REE201 - Electric Circuit Analysis

COURSE OBJECTIVES:

- To provide a comprehensive overview about amplifiers and oscillators constructed with discrete components like BJT and MOSFETs
- To develop the ability to design and implement analog circuits for real-world applications
- To build a strong foundation for the design and development of IC-based circuits

COURSE OUTCOMES:

CO 1:	Utilize semiconductor diodes to design basic electronic circuits under given conditions	**Apply**
CO 2:	Build amplifier and oscillator circuits using discrete components based on given circuit specifications	**Apply**
CO 3:	Analyze the characteristics and performance parameters of operational amplifiers using given circuit configurations	**Analyze**
CO 4:	Construct simple application circuits such as amplifiers, integrators, and comparators using operational amplifiers	**Apply**
CO 5:	Develop timer and voltage regulator circuits for specified engineering applications using appropriate electronic components	**Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	-	-	-	-	-	1	2	-
CO 2	3	2	1	1	-	-	-	-	-	-	1	2	-
CO 3	3	3	2	2	-	-	-	-	-	-	1	2	-
CO 4	3	2	1	1	-	-	-	-	-	-	1	2	-
CO 5	3	2	1	1	-	-	-	-	-	-	1	2	-

SYLLABUS:

UNIT I: SEMICONDUCTOR DIODES **9**

Ideal diode – PN junction diode – Zener diode – LED – Photo diode – Varactor diode – Schottky diode – Tunnel diode – Applications: halfwave and full wave rectifiers – Bridge rectifiers

UNIT II: TRANSISTORS AND OSCILLATORS **9**

Transistor construction and operation – CE configuration – MOSFET: enhancement and depletion – CMOS – Barkhausen criterion for oscillation – Phase shift and Hartley oscillator – Crystal oscillators

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UNIT III: CHARACTERISTICS OF OP AMP 9

Functional building block of Op Amp – Ideal and practical characteristics of Op Amp – Negative feedback – Inverting and Non-Inverting amplifier – Differential amplifier – DC performance: bias currents, offset voltage – AC performance: frequency response, slew rate, stability

UNIT IV: OP AMP APPLICATIONS 9

Adder – Subtractor – V to I Converter – I to V Converter – Differentiator and integrator – Waveform generator: clipper and clamper – ADC – Types: SAR, Dual Slope, Flash – DAC – Weighted resistor DAC – R-2R Ladder DAC

UNIT V: TIMERS AND REGULATORS 9

IC 555 Timer: monostable and astable mode – IC 566: voltage controlled oscillator – Voltage regulators: fixed and adjustable regulators – Switching regulators

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Roy Choudhury and Shail Jain, "Linear Integrated Circuits", 4th Edition, New Age International Publishers, 2010
2. A.S. Sedra, K.C. Smith, T.C. Carusone and V. Gaudet, "Microelectronics Circuits", 8th edition, Oxford University Press, 2019

REFERENCES:

1. Gayakwad R.A.,"Op-amps and Linear Integrated Circuits", Prentice Hall of India, New Delhi,4th Edition, 2009
2. James Fiore, "Operational Amplifiers and Linear Integrated Circuits: Theory and Application", 3rd edition, Dissidents, 2021
3. Albert Malvino and David Bates, "Electronic Principles", 9th edition, McGraw Hill Education, 2021

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SEMESTER III

U25EE304	Digital Logic Design	Category: PCC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To develop a strong foundation in digital logic concepts and enable the design of combinational and sequential circuits
- To facilitate analysis and design of synchronous and asynchronous sequential circuits including hazard-free systems
- To enable implementation of digital circuits using Verilog HDL through effective modeling and simulation techniques

COURSE OUTCOMES:

CO 1: Apply Boolean algebra and Karnaugh map techniques to simplify logic expressions and realize digital circuits using basic gates — **Apply**

CO 2: Apply design principles to develop combinational circuits such as adders, subtractors, multiplexers, and encoders for specified applications — **Apply**

CO 3: Analyze and design synchronous sequential circuits using flip-flops, counters, and state machine concepts — **Analyze**

CO 4: Analyze asynchronous sequential circuits by identifying race conditions and hazards and developing hazard-free digital systems — **Analyze**

CO 5: Apply Verilog HDL to model, simulate, and verify combinational and sequential circuits using appropriate test benches — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	2	1	-	-	-	-	-	-	2	2	-
CO 2	3	2	2	1	-	-	-	-	-	-	2	2	-
CO 3	3	3	3	2	-	-	-	-	-	-	1	2	-
CO 4	3	3	3	2	-	-	-	-	-	-	1	2	-
CO 5	3	2	2	1	2	-	-	-	-	-	2	2	-

SYLLABUS:

UNIT I: DIGITAL FUNDAMENTALS AND CIRCUITS — **6 + 6**

Boolean algebra: De-Morgan's theorem – Canonical and standard forms – Product of Sums (POS) and Sum of Products (SOP) simplification – Karnaugh Maps : Don't care conditions – Realization of logic circuits using NAND and NOR gates

UNIT II: COMBINATIONAL CIRCUITS — **6 + 6**

Design of adder, subtractor, comparators, code converter, encoder and decoder, multiplexers and demultiplexers – Applications

UNIT III: SYNCHRONOUS SEQUENTIAL CIRCUITS — **6 + 6**

Flipflops: SR, D, JK and T – Analysis and design of synchronous sequential circuits – Counters – State diagram, state reduction, state assignment, asynchronous and synchronous type

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UNIT IV: ASYNCHRONOUS SEQUENTIAL CIRCUITS **6 + 6**

Analysis and design of asynchronous sequential logic circuit : Fundamental and pulse mode – Race conditions – Hazards; Essential Hazards, Design of Hazard free circuits

UNIT V: HARDWARE MODELLING USING VERILOG **6 + 6**

Verilog HDL: Introduction – Basic building blocks and syntax of Verilog – Operators – Gate level modelling, Data flow modelling, Behavioral modelling – Test benches

LIST OF EXPERIMENTS

1. Design of parity generator and checker
2. Design of adder and subtractor
3. Design of parking system using multiplexer
4. Design of MOD 10 ripple counter
5. Simulation of combinational circuit using Verilog
6. Simulation of sequential circuit using Verilog

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. Morris Mano M, Michael D. Ciletti, "Digital Design with an Introduction to the Verilog HDL, VHDL and System Verilog", 6th edition, Pearson Education, 2018
2. David J. Comer, "Digital Logic and State Machine Design", 3rd edition, Oxford University Press, 2012
3. Charles H. Roth, Larry L. Kinney, "Fundamentals of Logic Design", 9th Edition, Cengage Learning, 2020

REFERENCES:

1. Soumitra Kumar Mandal, Digital "Electronics Principles and Application", 1st edition, McGraw-Hill Education, 2017
2. R.P.Jain, Thomas.L.Floyd, "Digital Fundamentals, 11th edition", Pearson Education, 2017
3. Stephen Brown, Zvonko Vranesic, "Fundamentals of Digital Logic with Verilog Design", 4th Edition, McGraw-Hill Education, 2019
4. Suman Lata Tripathi, "Digital Design and Verification Using Verilog and System Verilog", 1st Edition, Wiley, 2023

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SEMESTER III

U25ADG02	Data Structures and Algorithms (Common to AD, BM, EC, EE, MI)	Category: PCC				
		L	T	P	J	C
		3	0	2	0	4

QP PATTERN: A

COURSE OBJECTIVES:

- To understand the fundamental concepts of ADT and data structure types
- To learn linear and non linear data structures
- To explore tree and graph data structures

COURSE OUTCOMES:

CO 1: Implement linear data structures such as lists, stacks and queues using array-based and linked-list-based techniques — **Apply**

CO 2: Use searching and sorting techniques to solve real-time data organization problems — **Apply**

CO 3: Construct tree-based data structures including binary trees, binary search trees and AVL trees to perform efficient data representation, traversal and manipulation — **Apply**

CO 4: Use graph representations and graph algorithms to solve problems involving traversal, shortest paths, topological ordering and minimum spanning trees — **Apply**

CO 5: Examine the efficiency of algorithms by determining and comparing their time and space complexity — **Analyze**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	1	-	-	-	-	-	-	2	-
CO 2	3	2	1	1	1	-	-	-	-	-	-	2	-
CO 3	3	2	1	1	1	-	-	-	-	-	-	2	-
CO 4	3	2	1	1	1	-	-	-	-	-	-	2	-
CO 5	3	3	2	2	-	-	-	-	-	-	-	2	-

SYLLABUS:

UNIT I: LINEAR DATA STRUCTURES – LIST, STACKS, QUEUES — 9 + 6

Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list-based implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of linked list: Polynomial ADT, Radix sort, Multilist. Stack ADT – Operations – Applications – Symbol balancing - Evaluating arithmetic expressions – Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – DeQueue – Applications of queues

UNIT II: SEARCHING, SORTING AND HASHING TECHNIQUES — 9 + 6

Searching: Linear Search—Binary Search. Sorting: Bubble sort-Insertion sort-Selection sort- Merge sort - Quick sort. Hashing – Hash Functions – Separate Chaining – Open Addressing –Rehashing – Extendible Hashing

UNIT III: NON-LINEAR DATA STRUCTURES – TREES — 9 + 6

Tree ADT – Tree traversals – Binary Tree ADT – Expression trees – Binary search tree ADT –AVL Trees

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UNIT IV: NON-LINEAR DATA STRUCTURES - GRAPHS **9 + 6**

Introduction to Graph – Types of graph-Representation of graphs – Graph traversal: Breadth-first traversal – Depth-first traversal – Topological ordering –Dijkstra's algorithm- Minimum spanning tree algorithms – Prims algorithm - Kruskal's Algorithm

UNIT V: ALGORITHM ANALYSIS **9 + 6**

Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non recursive algorithms.

LIST OF EXPERIMENTS

1. A small library stores the list of newly arrived books in an array-based structure. The librarian wants to maintain the order of arrival. Given the arrival sequence: "AI Basics", "Data Science", "Python 101", "Algorithms", "Machine Learning", Insert them into an array-based List ADT. A book "Cyber Security" arrives and must be inserted at position 3. Later, "Python 101" is removed as it's damaged. Design the array-based List ADT operations to update the list and display the final order.
2. A hospital needs to maintain a waiting list of patients dynamically as patients arrive and get treated. Insert patients: John, Priya, Abdul, Meera in order. A senior citizen "Ravi" should be added after Priya. "Abdul" leaves before consultation. Using Linked List ADT, show how the list changes after each operation.
3. An airport check-in counter processes passengers using a circular queue system. Passengers arriving in order: P1, P2, P3, P4, P5. The queue size is 4 due to staff shortage. • Enqueue all passengers in order and show how overflow occurs. Two passengers are processed (dequeued). P6 and P7 arrive. Simulate these operations using array-based circular queue and show rear/front updates.
4. A bank uses a linked-list–based queue for serving customers. Customers: A, B, C arrive. Then D arrives. B and C are served. Implement the queue operations and show the dynamic linked list changes.
5. A sports event records running times of participants. The unsorted times are 15.2, 12.8, 20.5, 11.6, 19.3. The coach wants to sort the times to shortlist top performers. Apply Bubble Sort and Insertion Sort separately to sort the timings. Show the status of the list after each pass for both algorithms.
6. An online store wants to quickly sort product prices for discount analysis. Prices are 499, 199, 999, 350, 150, 750. Use Quick Sort (first element as pivot) and show partition steps. Use Merge Sort and show the splitting and merging stages.
7. A college stores roll numbers of students in a system. For a particular exam, the roll numbers are sorted [101, 115, 130, 145, 152, 170, 185]. • Apply Binary Search and show mid calculations for each iteration. Compare it with how Linear Search would behave for the same case. A teacher wants to find whether roll number 152 is present.
8. A company stores employee IDs in a hash table of size 10. Employee IDs: [1001, 1123, 1198, 1455, 1677]. Apply open addressing and closed addressing hashing techniques and show the optimal one.
9. A university stores student scores in a BST for quick rank retrieval. Scores: [75, 60, 90, 45, 65, 85, 95]. Construct the BST. Apply inorder, preorder, and postorder traversal. Later, student scores 45, 65 and 75need removal due to correction. Show the tree after each deletion and state the rule used.
10. A delivery company wants to find the fastest delivery route between warehouses in a city. Given a weighted graph (distances between warehouses): A → B : 4 A → C : 2 B → D : 5 C → B : 1 C → D : 8 D → E : 6 Apply Dijkstra's algorithm starting from A and determine: Shortest path from A to all other warehouses. Distance table update for each step.
11. A telecom company wants to lay cables between cities at minimum cost. The network between cities is modeled as a weighted graph. Apply Prim's algorithm to find the Minimum Spanning Tree and list the edges selected at each step, growing MST, total cost.
12. A power grid network wants to connect electricity stations with minimal wiring cost. The weighted edges between stations are provided. Apply Kruskal's algorithm by sorting edges by weight.

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CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 75 Periods

TEXTBOOKS:

1. Reema Thareja, "Data Structures and Algorithms", 1st edition, Oxford University Press, 2025
2. Ellis Horowitz, Sartaj Sahni,Susan Anderson Freed, "Fundamentals of Data Structures in C", 2nd Edition, Techno Series, 2024

REFERENCES:

1. R. Venkatesan, S. Lovelyn Rose, "Data Structures", 2nd Edition, Wiley, 2019
2. Seymour Lipschutz, "Data Structures", 2nd Edition, McGraw Hill Education, 2017
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D.Ullman, "The Design and Analysis of Computer Algorithms", 1 st Edition, Pearson Education Asia, 2013

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SEMESTER III

U25EE305	Electrical Machines I Laboratory	Category: PCC				
		L	T	P	J	C
		0	0	2	0	1

PRE-REQUISITES:

- U25EE201 - Electric Circuit Analysis / U25REE201 - Electric Circuit Analysis

COURSE OBJECTIVES:

- To provide hands-on experience in conducting standard tests on DC machines and evaluating their performance and speed control characteristics under various operating conditions
- To impart practical knowledge in testing single-phase transformers and evaluating their performance parameters using load, open-circuit, and short-circuit tests
- To enable the application of modern simulation tools for studying and validating the performance of DC machines and Transformers

COURSE OUTCOMES:

CO 1:	Conduct experiments to determine the performance characteristics of DC generators	**Apply**
CO 2:	Simulate and analyze the performance of DC motors under varying load conditions	**Analyze**
CO 3:	Analyze the efficiency and losses of DC machines using indirect testing methods	**Analyze**
CO 4:	Demonstrate and assess speed control methods of DC motors for practical applications	**Apply**
CO 5:	Determine transformer parameters and evaluate the performance of single-phase and three-phase transformers by simulation	**Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	2	1	-	1	1	1	-	2	-	2
CO 2	3	3	1	2	3	-	1	1	1	-	2	-	2
CO 3	3	3	1	2	1	-	1	1	1	-	2	-	2
CO 4	3	2	1	1	1	-	1	1	1	-	2	-	2
CO 5	3	2	1	2	3	-	1	1	1	-	2	-	2

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of DC shunt generator
2. Load test on DC shunt motor
3. Load test on DC series motor
4. Load test on DC compound motor
5. Swinburne's test on DC shunt machine
6. Speed control of DC shunt motor
7. Simulation of the performance characteristics of DC machines
8. Load test on single-phase transformers
9. Open circuit and short-circuit tests on single-phase transformer

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10. Study of three phase transformers
11. Simulation of the performance characteristics of single-phase and three phase transformers

CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 30 Periods

REFERENCES:

1. Stephen J. Chapman, "Electric Machinery and Power System Fundamentals", 5th Edition, McGraw-Hill Education, 2022
2. I.J. Nagrath, D.P. Kothari, "Electric Machines", 5th Edition, McGraw-Hill Education, 2017

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SEMESTER III

U25EE306	Analog Electronics and Applications Laboratory	Category: PCC				
		L	T	P	J	C
		0	0	2	2	2

COURSE OBJECTIVES:

- To develop a strong foundation in IC-based applications and their practical relevance
- To enable the design of analog circuits using systematic design procedures
- To facilitate the application of operational amplifiers in designing wave-shaping and regulator circuits

COURSE OUTCOMES:

CO 1: Apply design procedures to develop and implement rectifier and voltage regulator circuits through simulation and experimental validation — **Apply**

CO 2: Employ oscillator design principles to realize RC phase shift oscillators through simulation and experimental validation — **Apply**

CO 3: Analyze the performance characteristics of operational amplifier circuits, including inverting and non-inverting configurations — **Analyze**

CO 4: Apply timing circuit concepts to design and implement astable and monostable multivibrators using 555 timers — **Apply**

CO 5: Analyze the performance of active filters, clipper, and clamper circuits by evaluating their frequency response using simulation tools — **Analyze**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	3	2	3	-	1	2	1	-	-	2	-
CO 2	3	3	3	2	3	-	1	2	1	-	-	2	-
CO 3	3	3	3	2	3	-	1	2	1	-	-	2	-
CO 4	3	3	3	2	3	-	1	2	1	-	-	2	-
CO 5	3	3	3	2	3	-	1	2	1	-	-	2	-

LIST OF EXPERIMENTS

1. Design and implement full wave rectifier circuit through simulation and experiment
2. Design and implement a Zener diode voltage regulator circuit through simulation and experimental verification
3. Design and implement RC phase shift oscillator by simulation and experiment
4. Experimental verification of applications of OPAMP 741 such as inverting and non-inverting amplifier
5. Design and implement astable and monostable multivibrators using 555 timers
6. Design and implement active low pass and to obtain the frequency response of the filters by simulation
7. Design and simulate a series and shunt voltage regulator using simulation tool
8. Design and simulate the clipper and clamper circuits using simulation tool

CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** 30 Periods **Total:** 60 Periods

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REFERENCES:

1. Roy Choudhury and Shail Jain, "Linear Integrated Circuits", 4th Edition, New Age International Publishers, 2010
2. Ramakant A Gayakwad, "Op-amps and Linear Integrated Circuits", 4th Edition, Prentice Hall of India, 2009

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SEMESTER III

U25MNC02	Essence of Indian Traditional Knowledge (Common to all programmes)	Category: MNC				
		L	T	P	J	C
		1	0	0	0	0

COURSE OBJECTIVES:

- Understand the Concept of culture in ancient, medieval and modern period.
- Know the need and importance of Indian languages and Literature.
- Understand the various religion and philosophy in various periods.

COURSE OUTCOMES:

CO 1:	Understand Philosophy of Indian culture	**Understand**
CO 2:	Distinguish the Indian languages and literature.	**Understand**
CO 3:	Learn the philosophy of ancient, medieval and modern Indian	**Remember**
CO 4:	Acquire the information about the fine arts in India	**Apply**
CO 5:	Know the contribution of scientists different eras	**Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	2	-	1	-	-	3	-	-	-	-	-	-
CO 2	-	2	-	1	-	-	3	-	-	-	-	-	-
CO 3	-	2	-	1	-	-	3	-	-	-	-	-	-
CO 4	-	2	-	-	-	-	-	-	-	-	-	-	-
CO 5	-	2	-	1	-	-	3	-	-	-	-	-	-

SYLLABUS:

UNIT I: INTRODUCTION TO CULTURE 5

Culture, Civilization, Culture and heritage, General characteristics of culture, Importance of culture inhuman literature, Indian culture, Ancient India, Medieval India, Modern India

UNIT II: INDIAN LANGUAGES AND LITERATURE 5

Indian Languages and Literature-I: The role of Sanskrit, Significance of scriptures to current society, Indian philosophies, other Sanskrit literature, Literature of south India Indian Languages and Literature-II: Northern Indian Languages & literature, Temples and Temple types, Sculptors 's specialties, Temples Individualities Festivals and hopes

UNIT III: RELIGION AND PHILOSOPHY 5

Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (Selected Movements only)

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UNIT IV: ARTS, SCIENCE, TECHNOLOGY& ENGINEERING IN INDIA 5

Indian painting, Handicrafts, Music, Divisions of Indian classical music, Modern Indian music, Dance and drama, Indian architecture (ancient, medieval and modern), Science and technology in India, Development of science in different periods, Sushruta and Charaka, sages of South India, herbal treatments, Surgery methods of healers, Yoga and pranayama practices, Herbal usages and medication-making methods.

UNIT V: EDUCATION SYSTEM IN INDIA 5

Education in ancient, Medieval and modern India, Aims of education, subjects, languages, science and scientists of Ancient India, Medieval India and Modern India

CONTACT PERIODS:

Lecture: 25 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 25 Periods

TEXTBOOKS:

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005.
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN: 978-8187276333, 2007.

REFERENCES:

1. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989.
2. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, ISBN: 9788120810990, 2014.
3. S. Narain, "Examinations in Ancient India", Arya Book Depot, 1993.
4. NCERT, "Position Paper on Arts, Music, Dance and Theatre", 2000.
5. B. Kumar Mohanta & Vipin Kumar Singh, "Traditional Knowledge System and Technology in India", 2012.

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SEMESTER III

U25MCC08	Professional Skill Development - I (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		15 hours				1

COURSE OUTCOMES:

CO 1: Demonstrate technical skill competency through attainment of industry-relevant certifications, participation in competitions, internships, and project-based learning activities — **Apply**

CO 2: Apply research, innovation, and problem-solving skills to develop impactful solutions through projects, publications, patents, and higher education preparation — **Apply**

CO 3: Exhibit leadership, ethical responsibility, community engagement, and professional digital presence to enhance career readiness and lifelong learning — **Apply**

CO - PO MAPPING:

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

GUIDLINES:

- Certifications and Skill Credentials - Free awareness certs, NPTEL/Coursera, Associate-level, Professional-level, Expert-level
- Competitions, Hackathons, and Technical Challenges - Online, institution, state, national, international competitions and hackathons, Kaggle medals
- GATE Preparation and Performance - Study plan, mock tests, registration, appearing, score percentile
- Academic, Industry, and Innovation Projects - Mini-projects, intermediate projects, industry-grade deployed projects, funded or published projects
- Internships and Industrial Training - Virtual, on-site short, core role, CoE on-campus, PPO, PPO converted to offer
- Research Publications, Patents, Intellectual Property - Reading journals, survey papers, conference papers, Scopus/WoS, Q1/Q2 journals, patents from provisional to granted
- Leadership, Community, Digital Presence - Club membership, event roles, office bearer, president, outreach, LinkedIn, GitHub, portfolio, Google Scholar

CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 0 Periods

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SEMESTER IV

U25MA403	Numerical Methods and Partial Differential Equations (Common to CE, EE, ME, MI)	Category: BSC				
		L	T	P	J	C
		3	0	0	0	3

PRE-REQUISITES:

- U25MA101 - Calculus and Differential Equations / U25RMA101 - Multivariable Calculus and Applications

COURSE OBJECTIVES:

- To provide knowledge of numerical methods for solving nonlinear equations, systems of linear equations, interpolation, differentiation, and integration problems
- To develop the ability to formulate and solve partial differential equations using standard analytical techniques
- To impart an understanding of Fourier series and boundary value problems arising in heat flow and wave propagation

COURSE OUTCOMES:

CO 1:	Apply numerical methods to solve systems of linear equations and compare the efficiency of various solution techniques	**Apply**
CO 2:	Apply interpolation techniques to estimate unknown values and analyze the accuracy of the approximations	**Apply**
CO 3:	Implement numerical differentiation and integration methods to obtain approximate solutions and evaluate their accuracy	**Apply**
CO 4:	Apply standard methods to solve partial differential equations and interpret the resulting solutions under given conditions	**Apply**
CO 5:	Apply Fourier series and partial differential equation techniques to solve heat and wave equations under different boundary conditions	**Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	-	-	-	-	-	-	-	-	-	-	1
CO 2	3	2	-	-	-	-	-	-	-	-	-	-	1
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	1
CO 4	3	2	-	-	-	-	-	-	-	-	-	-	1
CO 5	3	2	-	-	-	-	-	-	-	-	-	-	1

SYLLABUS:

UNIT I: SYSTEM OF EQUATIONS 9

Solution of nonlinear equations – Newton Raphson method, Regular false – Solution of system of linear equations – Gauss elimination method, Iterative solution of linear systems by Gauss-Seidel method

UNIT II: INTERPOLATION 9

Interpolation with equal intervals – Newton's forward and backward difference formulae, Interpolation with unequal intervals – Lagrange Interpolation

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UNIT III: NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Approximation of derivatives using interpolation polynomials for an equal interval – Numerical Integration – Trapezoidal rule, Simpson's 1/3 rule,evaluation of double integrals by Trapezoidal rule

UNIT IV: PARTIAL DIFFERENTIAL EQUATIONS 9

Formation of Partial Differential Equations – Lagrange's linear equation – Solution of second-order homogeneous partial differential equations with constant coefficients

UNIT V: BOUNDARY VALUE PROBLEM 9

Fourier Series solutions – One-dimensional wave equation – One-dimensional heat flow equation (unsteady state) – Two-dimensional heat flow equation (Steady state, Cartesian form only)

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Steven C Chapra and Raymond P Canale, "Numerical Methods for Engineers", Tata McGraw Hill, New Delhi, 2021
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th edition, Wiley India Pvt Ltd, New Delhi, 2018

REFERENCES:

1. Curtis F Gerald and Patrick O Wheatly, "Applied Numerical Analysis", Pearson Education, New Delhi, 2017
2. Grewal, B S and Grewal J S, "Numerical Methods in Engineering and Science", , Khanna Publishers, New Delhi, 2015
3. Bali N.P., & Manish Goyal, "Engineering mathematics", 12th edition, Lakshmi Publication, 2016
4. Peter V.O`Neil, "Advanced Engineering Mathematics", Cengage, 2016

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SEMESTER IV

U25EE401	Electrical Machines II	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

PRE-REQUISITES:

- U25EE302 - Electrical Machines I

COURSE OBJECTIVES:

- To develop a foundational understanding of the construction and operating principles of AC machines
- To build analytical competence in examining the characteristics, performance, starting and control of AC machines
- To provide a strong foundation on the construction, operation, characteristics and applications of special electrical machines

COURSE OUTCOMES:

CO 1: Analyze the operating characteristics, voltage regulation and parallel operation of alternators under specified operating conditions — **Analyze**

CO 2: Analyze the performance characteristics and operating behavior of synchronous motors using phasor diagrams and torque relations — **Analyze**

CO 3: Apply the equivalent circuit and torque–slip characteristics of three–phase induction motors to evaluate starting and speed control methods — **Apply**

CO 4: Analyze the operating principles and performance characteristics of single–phase induction motors for domestic applications — **Analyze**

CO 5: Apply the operating principles and performance equations of special electrical machines for suitable engineering applications — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	2	1	-	-	-	-	-	-	2	-	3
CO 2	3	3	2	1	-	-	-	-	-	-	2	-	3
CO 3	3	2	1	-	-	-	-	-	-	-	2	-	3
CO 4	3	3	2	1	-	-	1	-	-	-	2	-	3
CO 5	3	2	1	-	-	-	-	-	-	-	2	-	3

SYLLABUS:

UNIT I: ALTERNATORS — **9**

Construction – Principle of operation – EMF equation – Types of rotors – Armature reaction – Load characteristics – Voltage regulation – EMF, MMF, ZPF and A.S.A method – Two reaction theory – Parallel operation – Slip test

UNIT II: SYNCHRONOUS MOTORS — **9**

Principle of operation – Torque equation – Synchronous machines on infinite bus bars – Phasor diagram – V and inverted V curves – Hunting and its suppression – Starting methods – Damper windings – Synchronous condenser

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UNIT III: THREE PHASE INDUCTION MOTORS 9

Construction of squirrel cage and wound rotor motors – Rotating magnetic field – Cogging and crawling – Equivalent circuit – Torque–slip characteristics – Starting methods – Speed control – Induction generators

UNIT IV: SINGLE PHASE INDUCTION MOTORS 9

Construction – Double field revolving theory – Equivalent circuit – Starting methods and types – Applications – Case Study: Washing machines and refrigerator compressor – IE standards

UNIT V: SPECIAL ELECTRICAL MACHINES 9

Construction, principle of operation, types, EMF and torque equation of stepper motors, switched reluctance motors, permanent magnet brushless DC motors and permanent magnet synchronous motors – Applications

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Stephen J. Chapman, "Electric Machinery and Power System Fundamentals", 5th Edition, McGraw Hill Education, 2022
2. P.C. Sen, "Principles of Electric Machines and Power Electronics", 3rd Edition, John Wiley & Sons Inc, 2013

REFERENCES:

1. I.J. Nagrath, D.P. Kothari, "Electric Machines", 5th Edition, McGraw Hill Education, 2017
2. Juha Pyrhonen, Tapani Jokinen, Valeria Hrabovcova, "Design of Rotating Electrical Machines", 2nd Edition, John Wiley and Sons Inc, 2014
3. T.J.E.Miller, 'Brushless Permanent Magnet and Reluctance Motor Drives', Clarendon Press, Oxford, 1993

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Learn Beyond

SEMESTER IV

U25EE402	Power Transmission and Distribution	Category: PCC				
		L	T	P	J	C
		3	1	0	0	4

PRE-REQUISITES:

- U25EE301 - Electromagnetic Theory and Applications

COURSE OBJECTIVES:

- To develop a comprehensive understanding of the principles, design, and operation of power generation, transmission, and distribution systems
- To facilitate analysis of transmission line performance, distribution networks, and overall system reliability
- To enable exploration of smart grid concepts, distributed generation, and power quality enhancement techniques

COURSE OUTCOMES:

CO 1: Explain the layout, types, and characteristics of conventional and non-conventional power generation systems — **Understand**

CO 2: Analyze transmission line parameters and performance using analytical and software approaches — **Analyze**

CO 3: Design overhead transmission systems considering mechanical and electrical aspects — **Apply**

CO 4: Model and analyze distribution systems and apply load-flow techniques using software tools — **Analyze**

CO 5: Apply reliability assessment and automation techniques in modern power systems with distributed generation and power-quality improvement — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	1	-	-	-	-	-	-	-	-	2	-	3
CO 2	3	3	2	2	2	-	-	-	-	-	1	-	3
CO 3	3	2	2	2	2	-	-	-	-	-	1	-	3
CO 4	3	3	2	2	2	-	-	-	-	-	1	-	3
CO 5	3	2	2	2	1	2	-	-	-	-	2	-	3

SYLLABUS:

UNIT I: POWER GENERATION TECHNOLOGIES — 9 + 3

Structure of power systems – Transmission voltages and their significance – Right of way – Conventional energy sources: Layout, components, and working principles of thermal and hydro power plants – Non-conventional sources: solar, wind, biomass, and small hydro systems – Load curves, load factor, and diversity factor – Recent trends in hybrid and smart power generation systems

UNIT II: TRANSMISSION LINE PARAMETERS AND PERFORMANCE — 9 + 3

Calculation of line parameters: resistance, inductance, and capacitance of single and double-circuit lines – Performance of short and medium lines: voltage regulation, efficiency, ABCD parameters – Ferranti effect

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UNIT III: TRANSMISSION LINE DESIGN AND GROUNDING **9 + 3**

Mechanical design of lines: sag and tension calculations, effects of wind and ice loading – Electrical aspects: corona, insulators, string efficiency, grading of cables – System metering – Grounding practices

UNIT IV: DISTRIBUTION SYSTEMS AND LOAD MANAGEMENT **9 + 3**

Distribution system structure: feeders, distributors, service mains – Types of systems (radial, ring, interconnected) – AC and DC system analysis: voltage drop and power loss – Load characteristics: load factor, diversity factor – Demand-side management and smart metering – Grid Modernization and Management

UNIT V: POWER SYSTEM RELIABILITY AND POWER QUALITY **9 + 3**

Reliability concepts: SAIFI, SAIDI, and CAIDI – SCADA architecture and communication protocols – Integration of distributed energy resources – Power-quality issues: voltage sag/swell, harmonics, flicker, and interruptions – IoT-based monitoring and energy-storage systems for grid support

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** 15 Periods **Practical:** - Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. D. P. Kothari, I. J. Nagrath, "Modern Power System Analysis", 5th Edition, McGraw-Hill India, 2022
2. Turan Gönen, Chee-Wooi Ten, Ali Mehrizi-Sani, "Electric Power Distribution Engineering", 4th Edition, CRC Press, 2024
3. C. L. Wadhwa, "Electrical Power Systems", 7th Edition, New Age International, 2017

REFERENCES:

1. J. Duncan Glover et al., "Power System Analysis and Design", Cengage, 2021
2. IEEE PES Technical Reports – Smart Grid and Distribution Automation Series
3. Vendor Tutorials: ETAP, MATLAB Simulink, HOMER Pro case modules

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SEMESTER IV

U25ECG04	Microprocessors and Microcontrollers (Common to EC, EE)	Category: PCC				
		L	T	P	J	C
		3	0	2	0	4

PRE-REQUISITES:

- U25ECG02 - Digital System Design / U25EE304 - Digital Logic Design

COURSE OBJECTIVES:

- To understand the architecture and functioning of 8085 microprocessors and the 8051, PIC microcontrollers
- To write program in assembly language and embedded C
- To comprehend and implement interfacing techniques for memory, I/O devices, and peripheral components with microcontroller

COURSE OUTCOMES:

CO 1:	Develop assembly language programs to implement ALU operations using 8085 microprocessor	**Apply**
CO 2:	Use timer and serial communication of the 8051 microcontroller for simple applications	**Apply**
CO 3:	Implement control structures, functions and I/O port operations using embedded C	**Apply**
CO 4:	Build real-time applications using the 8051 microcontroller	**Apply**
CO 5:	Design PIC-based interfacing applications using communication protocols	**Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	-	-	2	2	-	1	3	-
CO 2	3	2	1	1	-	-	-	2	2	-	1	3	-
CO 3	3	2	1	1	2	-	-	2	2	-	1	3	-
CO 4	3	2	1	1	2	-	-	2	2	-	1	3	-
CO 5	3	2	1	1	2	-	-	2	2	-	1	3	-

SYLLABUS:

UNIT I: 8085 MICROPROCESSORS **9 + 6**

Architecture – Signals – Addressing modes – Instruction sets – Assembly language programming – Timing diagrams – Interrupts and interrupt service routines

UNIT II: 8051 MICROCONTROLLER **9 + 6**

Harvard architecture – 8051 microcontroller – Internal architecture – Signals – Special Function Registers (SFR) – I/O Pins Ports and Circuits – Instruction set – Timers-Modes, Registers and Timer Programming – Serial Communication – Registers, RS232 standards and programming – Interrupts Programming

UNIT III: EMBEDDED C PROGRAMMING **9 + 6**

Introduction to Embedded C – Structure of an Embedded C Program – Data Types and Variables – Operators and Logic Operations – Decision Making and Looping Statements – Functions in Embedded C – Time Delay Generation – Input/Output Port Programming – Bit Manipulation and Register Access

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UNIT IV: 8051 MICROCONTROLLER INTERFACING **9 + 6**

Interfacing of Simple I/O Systems – Switches, LEDs and Buzzers – Interfacing Character and Graphical LCD Displays – Interfacing External ADC and DAC – Stepper Motor Interfacing – DC motor speed control system – Relays

UNIT V: PIC18 MICROCONTROLLER **9 + 6**

Overview of PIC family – Architecture – Memory Organization and Special Function Registers – Signals – Interrupt structure – Development Tools-MPLAB X IDE and XC8 Compiler – Embedded C Programming for PIC – I2C and SPI protocol

LIST OF EXPERIMENTS

1. Perform basic arithmetic and logic operations using 8085 microprocessor
2. Interface display modules with an 8051 microcontroller for control applications using Embedded C
3. Implement real time clock in an 8051 microcontroller using Embedded C
4. Design and implement a robotic arm control system using a stepper motor with an 8051 microcontroller using Embedded C
5. Interface a DAC with an 8051 microcontroller for waveform generation using Embedded C
6. Design a switch-controlled LED indicator system using digital I/O ports in a PIC microcontroller using MPLAB
7. Implement communication protocols (USART/SPI/I2C) in a PIC microcontroller using MPLAB

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 75 Periods

TEXTBOOKS:

1. Krishna Kant, "Microprocessor and Microcontrollers Architecture, Programming and System Design using 8085, 8086, 8051, 8096", 2nd edition, Prentice Hall of India, 2014
2. Mazidi Muhammed Ali, Mazidi Janice Gillispie, "The 8051 Microcontrollers and Embedded Systems", 2nd edition, Pearson Education India, 2012
3. Mazidi, M. A., McKinlay, R. D., and Causey, D., "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18", 2nd Edition, Pearson Education, 2008. Reprint 2016

REFERENCES:

1. Soumitra Kumar Mandal,"Microprocessors and Microcontrollers Architecture Programming and Interfacing using 8085 8086 & 8051", 1st edition, Tata McGraw Hill, 2011
2. Kenneth Ayala, "The 8051 Microcontrollers",3rd edition, Cengage Learning India, 2007

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SEMESTER III & IV

U25CSG11	Object Oriented Programming Using Java (Common to AD, AM, BM, CB, CS, EC, EE, IT, MI, SC)	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

QP PATTERN: A

COURSE OBJECTIVES:

- To introduce object-oriented programming concepts and Core Java programming fundamentals
- To develop Java applications using classes, inheritance, polymorphism, interfaces, and exception handling mechanisms
- To provide programming skills in multithreading, collections framework, and file handling using Java APIs
- To enable students to develop modular and reusable Java applications using standard libraries and object-oriented design principles

COURSE OUTCOMES:

CO 1:	Use object-oriented programming concepts and core Java fundamentals to develop simple applications	Apply
CO 2:	Implement Java applications using inheritance, polymorphism, abstract classes, interfaces, and packages	Apply
CO 3:	Demonstrate exception handling and multithreading concepts in Java programs	Apply
CO 4:	Develop Java applications using collections, generics, and related utility classes	Apply
CO 5:	Choose suitable file handling, stream processing, and object serialization techniques for Java applications	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	-	-	-	-	-	-	2	-
CO 2	3	2	2	1	-	-	-	-	-	-	1	2	-
CO 3	3	2	2	2	-	-	-	-	-	-	2	2	-
CO 4	3	2	2	2	-	-	-	-	-	-	2	2	-
CO 5	3	2	2	1	-	-	-	-	-	-	2	2	-

SYLLABUS:

UNIT I: INTRODUCTION TO OBJECT-ORIENTED PROGRAMMING AND JAVA BASICS 9

Procedure-Oriented vs Object-Oriented Java Features and Platform: JVM, JRE, JDK – Java Program Structure & Memory Layout – Classes and Objects – Static and non-static members, static and non-static Methods, Constructors – Access Modifiers, Abstraction and Encapsulation – Scanner and System classes

UNIT II: INHERITANCE AND POLYMORPHISM 9

Inheritance and types – Polymorphism: Method Overloading and Overriding – Abstract Classes and Methods – Interfaces. Java packages : Built in and user defined packages

UNIT III: EXCEPTION HANDLING AND MULTITHREADING 9

Exception Handling: try, catch, throw, throws, finally – Built in exception classes and User defined Exceptions – Multithreading: Thread Lifecycle, Creating Threads, Thread Class and Runnable Interface, Thread Priorities, Synchronization – Inter-thread Communication, Deadlock prevention

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UNIT IV: COLLECTIONS FRAMEWORK AND GENERICS 9

Collections Framework – Generics and Type Safety – Wrapper Classes and Autoboxing/Unboxing – Interfaces and Classes: List, Set, Map, Queue – Implementations: ArrayList, LinkedList, HashSet, TreeSet, HashMap, TreeMap – Iterators – Comparator and Comparable Interfaces

UNIT V: JAVA I/O AND FILES 9

Java I/O Framework – Input and Output Streams – Readers and Writers – File I/O using File, FileReader, FileWriter, BufferedReader, BufferedWriter and Files – Console Input using Scanner and Console – Serialization and Deserialization – Object Streams

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Herbert Schildt, "Java: The Complete Reference", 11th Edition, McGraw Hill Education, 2018
2. Cay S. Horstmann and Gary Cornell, "Core Java 2, Vol 1, Fundamentals", 11th Edition, Pearson Education, 2020

REFERENCES:

1. J. Nino and F. A. Hosch, "An Introduction to Programming and OO Design using Java", 1st Edition, John Wiley & Sons, 2018
2. Paul Deitel and Harvey Deitel, "Java SE 8 for Programmers", 3rd Edition, Pearson, 2015
3. E. Balagurusamy, "Programming with Java", 6th Edition, McGraw Hill Education, 2019

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SEMESTER IV

U25EE403	Electrical Machines II Laboratory	Category: PCC				
		L	T	P	J	C
		0	0	2	0	1

PRE-REQUISITES:

- U25EE305 - Electrical Machines I Laboratory

COURSE OBJECTIVES:

- To provide hands-on experience in conducting standard tests on synchronous and induction machines and evaluating their operating characteristics and performance parameters
- To develop the ability to determine machine characteristics, losses, equivalent circuit parameters, and voltage regulation of AC machines through experimental investigation and analysis
- To impart practical knowledge in the application of modern simulation tools for studying and validating the performance of AC machines

COURSE OUTCOMES:

CO 1: Determine the voltage regulation and synchronous machine parameters of alternators using standard experimental methods — **Apply**

CO 2: Analyze the operating characteristics of synchronous motors through V-curve and inverted V-curve tests — **Analyze**

CO 3: Determine the equivalent circuit parameters and performance characteristics of induction motors using standard tests — **Apply**

CO 4: Analyze the losses and operating performance of single-phase and three-phase induction motors under different operating conditions — **Analyze**

CO 5: Apply simulation tools to evaluate and validate the performance characteristics of AC machines — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	1	-	1	1	1	-	2	-	2
CO 2	3	3	1	2	1	-	1	1	1	-	2	-	2
CO 3	3	3	1	2	1	-	1	1	1	-	2	-	2
CO 4	3	2	1	1	1	-	1	1	1	-	2	-	2
CO 5	3	2	1	2	3	-	1	1	1	-	2	-	2

LIST OF EXPERIMENTS

1. Regulation of three-phase alternator by EMF and MMF methods
2. V and Inverted V curves of three-phase synchronous motor
3. Load test on three-phase induction motor
4. No-load and blocked-rotor test on three-phase induction motor
5. Separation of no-load losses of three-phase induction motor
6. Load test on single-phase induction motor
7. No-load and blocked-rotor test on single-phase induction motor

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8. Slip test on salient-pole synchronous machine
9. Simulation of the performance characteristics of AC machines

CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 30 Periods

REFERENCES:

1. P.C. Sen, "Principles of Electric Machines and Power Electronics", 3rd Edition, John Wiley and Sons Inc, 2013
2. I.J. Nagrath, D.P. Kothari, "Electric Machines", 5th Edition, McGraw–Hill Education, 2017

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SEMESTER III & IV

U25CSG13	Object Oriented Programming Using Java Laboratory (Common to AD, AM, BM, CB, CS, EC, EE, IT, MI, SC)	Category: PCC				
		L	T	P	J	C
		0	0	2	0	1

COURSE OBJECTIVES:

- To understand the fundamental concepts of object-oriented programming using Java for developing modular and reusable applications
- To apply inheritance, polymorphism, exception handling, and multithreading concepts in developing robust Java applications
- To develop collection-based and file-processing applications using Java I/O, generics, and collections framework for real-world problem solving

COURSE OUTCOMES:

CO 1:	Implement the fundamental concepts of object-oriented programming, Java program structure, classes, objects, and encapsulation principles	**Apply**
CO 2:	Develop Java applications using inheritance, polymorphism, abstract classes, interfaces, and packages	**Apply**
CO 3:	Implement exception handling and multithreading mechanisms for developing reliable and concurrent applications	**Apply**
CO 4:	Utilize collections framework, generics, and sorting mechanisms for efficient data management and processing	**Apply**
CO 5:	Develop file handling and object persistence applications using Java I/O streams, serialization, and deserialization techniques	**Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	-	-	-	-	-	1	2	-
CO 2	3	2	1	1	-	-	-	-	-	-	1	2	-
CO 3	3	2	1	1	-	-	-	-	-	-	1	2	-
CO 4	3	2	1	1	-	-	-	-	-	-	1	2	-
CO 5	3	2	2	2	-	-	-	-	-	-	2	2	-

LIST OF EXPERIMENTS

1. Design and implementation of Java programs demonstrating classes, objects, constructors, and methods
2. Development of applications illustrating static and non-static members, access modifiers, abstraction, and encapsulation
3. Implementation of console-based applications using Scanner and System classes for input and output processing
4. Design and implementation of applications demonstrating inheritance and its various types
5. Development of applications illustrating compile-time and runtime polymorphism using method overloading and method overriding
6. Implementation of applications using abstract classes, interfaces, and dynamic method dispatch mechanisms
7. Design and development of modular Java applications using built-in and user-defined packages
8. Implementation of robust exception handling mechanisms using built-in and user-defined exceptions
9. Development of multithreaded applications using Thread class and Runnable interface

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10. Design and implementation of synchronized multithreaded applications with inter-thread communication
11. Development of applications demonstrating thread lifecycle management and deadlock prevention techniques
12. Implementation of generic collection-based applications using List, Set, Map, and Queue interfaces
13. Design of applications utilizing Comparator and Comparable interfaces for customized sorting operations
14. Development of file processing applications using Java I/O streams, readers, writers, and buffered streams
15. Implementation of object persistence mechanisms using serialization and deserialization techniques

CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 30 Periods

REFERENCES:

1. Herbert Schildt, "Java: The Complete Reference", 11th Edition, McGraw Hill Education, 2018
2. Cay.S.Horstmann and Gary Cornell, "Core Java 2, Vol 1, Fundamentals", 11th Edition, Pearson Education, 2020

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Learn Beyond

SEMESTER IV

U25MNC03	Indian Constitution (Common to all programmes)	Category: MNC				
		L	T	P	J	C
		1	0	0	0	0

COURSE OBJECTIVES:

- To understand the evolution and importance of the Constitution.
- To understand salient features of the Indian Constitution and philosophy of Fundamental Rights
- To gain the knowledge about the state government and local level administration

COURSE OUTCOMES:

CO 1: Understand the historical background of the Constitution making and its importance for building a democratic India — **Understand**

CO 2: Understand the value of Fundamental Rights and Duties for becoming a good citizen of India — **Understand**

CO 3: Analyze the powers of the Central Government — **Analyze**

CO 4: Understand the role and responsibilities of State and Local Administration — **Understand**

CO 5: Apply knowledge in strengthening constitutional institutions like Election Commission and UPSC for sustaining democracy — **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	1	2	3	-	-	-	-	-
CO 2	-	-	-	-	-	1	2	3	-	-	-	-	-
CO 3	-	-	-	-	-	1	2	3	-	-	-	-	-
CO 4	-	-	-	-	-	1	2	3	-	-	-	-	-
CO 5	-	-	-	-	-	1	2	3	-	-	-	-	-

SYLLABUS:

UNIT I: HISTORICAL BACKGROUND OF INDIAN CONSTITUTION — **5**

Introduction to Indian Constitution: Constitution Meaning of the term, History of Making of the Indian Constitution, Evolution of the Indian Constitution, Drafting Committee (Composition and Working).

UNIT II: FEATURES OF INDIAN CONSTITUTION — **5**

Philosophy and salient features of the Indian Constitution, Citizenship, Fundamental Rights, Duties and their significance, Directive Principles of State Policy, Rights Protective Mechanisms in India; Right to Education Act 2009; Right to Information 2005.

UNIT III: UNION GOVERNMENT — **5**

Union Legislature (Parliament), Lok Sabha and Rajya Sabha (with Powers and Functions), Union Executive, President of India (with Powers and Functions), Prime Minister and Council of Ministers (with Powers and Functions), Cabinet and Central Secretariat, Union Judiciary (Supreme Court).

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UNIT IV: STATE GOVERNMENT AND LOCAL ADMINISTRATION **5**

Governor, Chief Minister and Council of Ministers, State Secretariat – Roles and Responsibilities, District Administration, Head, Municipalities – Mayor and Role of Elected Representatives, Panchayati Raj, Zila Panchayat – Roles and Responsibilities, Block Level and Village Level Organizational Hierarchy

UNIT V: CONSTITUTIONAL INSTITUTIONS **5**

Election Commission of India – Powers and Functions, Electoral Process in India, Methods of Constitutional Amendments and their Limitations, Important Constitutional and gist Emergency Provisions. Case Studies.

CONTACT PERIODS:

Lecture: 25 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 25 Periods

TEXTBOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice Hall of India Pvt. Ltd., New Delhi.
2. Subash Kashyap, "Indian Constitution", National Book Trust.

REFERENCES:

1. M. Laxmikanth, "Indian Polity", McGraw Hill Education India, 2013.
2. M. P. Jain, "Indian Constitution Law," 7th Edition, Lexis Nexis, 2014.
3. Raj Kumar, "Ambedkar and Constitution", Commonwealth Publication Pvt. Ltd., New Delhi, 2011

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SEMESTER IV

U25MCC09	Professional Skill Development - II (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		15 Hours				1

COURSE OUTCOMES:

CO 1: Demonstrate technical skill competency through attainment of industry-relevant certifications, participation in competitions, internships, and project-based learning activities — **Apply**

CO 2: Apply research, innovation, and problem-solving skills to develop impactful solutions through projects, publications, patents, and higher education preparation — **Apply**

CO 3: Exhibit leadership, ethical responsibility, community engagement, and professional digital presence to enhance career readiness and lifelong learning — **Apply**

CO - PO MAPPING:

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

GUIDLINES:

- Certifications and Skill Credentials - Free awareness certs, NPTEL/Coursera, Associate-level, Professional-level, Expert-level
- Competitions, Hackathons, and Technical Challenges - Online, institution, state, national, international competitions and hackathons, Kaggle medals
- GATE Preparation and Performance - Study plan, mock tests, registration, appearing, score percentile
- Academic, Industry, and Innovation Projects - Mini-projects, intermediate projects, industry-grade deployed projects, funded or published projects
- Internships and Industrial Training - Virtual, on-site short, core role, CoE on-campus, PPO, PPO converted to offer
- Research Publications, Patents, Intellectual Property - Reading journals, survey papers, conference papers, Scopus/WoS, Q1/Q2 journals, patents from provisional to granted
- Leadership, Community, Digital Presence - Club membership, event roles, office bearer, president, outreach, LinkedIn, GitHub, portfolio, Google Scholar

CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 0 Periods

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