



Learn Beyond

**KPR Institute of  
Engineering and  
Technology**

(Autonomous, Affiliated to Anna University)

# CURRICULUM AND SYLLABI REGULATIONS – 2025

Department of  
**Electronics and Communication Engineering**

## **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 centre of excellence for education, research and development in the field of Electronics and Communication Engineering to meet the growing needs of the society

### **Mission**

The mission of the department is to

- Develop competencies in emerging technologies through skill based education collaborating with industries of repute
- Provide conducive environment for research and innovation to cater to the needs of the society
- Inculcate professionalism, ethical values and lifelong learning

## **III. Program Educational Objectives (PEOs)**

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

**PEO1:** Apply principles of Electronics and Communication Engineering to provide solutions to the emerging problems in the society

**PEO2:** Embrace technological challenges through skill upgradation or higher education or research

**PEO3:** Exhibit leadership qualities with professional and ethical values

## **IV. Program Outcomes (POs)**

Graduates of the ELECTRONICS AND COMMUNICATION 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)



- 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 ELECTRONICS AND COMMUNICATION ENGINEERING will be able to

- PSO1:** Design and develop intelligent systems using embedded controllers, Internet of Things and network security protocols
- PSO2:** Design, fabricate and test modern antennas for communication systems

#### 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	2	2	2	2	2	3	3
PEO 2	3	3	3	3	3	2	1	2	1	2	2	3	3
PEO 3	-	-	-	-	-	-	3	3	3	3	3	1	1

## 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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
	Electronics Engineering Studio	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-
	Français pour les Ingénieurs – French I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Nihongo no Enginia – Japanese I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Hindi for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Deutsch für Ingenieure – German I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Induction Program - Universal Human Values I	-	-	-	-	-	✓	✓	✓	-	-	✓	-	-
	தமிழர் மரபு / Heritage of Tamils	-	-	-	-	-	-	✓	✓	-	✓	-	-	-
	Design Thinking	✓	✓	✓	✓	-	-	-	-	✓	✓	✓	-	-
	Biology for Engineers	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	-	-
	Computer Fundamentals and Coding Essentials	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	-	-
II	English Proficiency II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Linear Algebra and Complex Variables	✓	✓	-	✓	✓	-	-	-	-	-	✓	-	-
	Materials Science for Electronics Engineering	✓	✓	✓	-	✓	-	-	-	-	-	-	✓	✓
	Environmental Science and Sustainability	✓	✓	✓	✓	✓	✓	✓	-	✓	-	✓	-	-
	Computational Problem Solving using Python	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓	-
	Basics of Mechanical Engineering	✓	✓	-	-	-	✓	-	-	-	-	-	-	-
	Basics of Electrical Engineering	✓	✓	-	-	-	-	-	-	-	-	✓	-	-
	Basics of Civil Engineering	✓	✓	✓	-	-	-	-	-	-	-	✓	-	-
	Engineering Graphics	✓	✓	-	-	✓	-	✓	✓	✓	-	✓	-	-

Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PS01	PS02
	Electronic Devices and Circuits	✓	✓	✓	✓	✓	-	-	✓	✓	✓	-	✓	-
	Hindi for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Français pour les Ingénieurs – French II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Nihongo no Enginia – Japanese II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Deutsch für Ingenieure – German II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Universal Human Values II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	-	-	-	-	-	-	✓	✓	-	✓	-	-	-
	Design Thinking	✓	✓	✓	✓	-	-	-	-	✓	✓	✓	-	-
	Biology for Engineers	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	-	-
	Computer Fundamentals and Coding Essentials	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	-	-



## ELECTRONICS AND COMMUNICATION 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	U25EC101	Electronics Engineering Studio	PCC	TwL	1	-	4	-	3
8	U25LEG01 U25LEG02 U25LEG03 U25LEG04	Deutsch für Ingenieure – German I Nihongo no Enginia – Japanese I Français pour les Ingénieurs – French I Hindi 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	தமிழர் மரபு / 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	U25MA203	Linear Algebra and Complex Variables	BSC	TwL	2	-	2	-	3
3	U25PH206	Materials Science for 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 U25EEG01 U25MEG02	Basics of Civil Engineering Basics of Electrical Engineering Basics of Mechanical Engineering	ESC	TwL	1	-	2	-	2
7	U25MEG03	Engineering Graphics	ESC	L	-	-	4	-	2
8	U25EC201	Electronic Devices and Circuits	PCC	TwL	2	-	2	-	3

No	Course Code	Title	Category	Type	L	T	P	J	C
9	U25LEG05	Deutsch für Ingenieure – German II	HSMC	TwL	1	-	2	-	2
	U25LEG06	Nihongo no Enginia – Japanese II							
	U25LEG07	Français pour les Ingénieurs – French II							
	U25LEG08	Hindi for Engineers - II							
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	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	MCC	Tamil Courses	1	-	-	-	1
12	U25MCC03	Design Thinking	MCC	MCC	1	-	2	-	2
	U25MCC04	Computer Fundamentals and Coding Essentials @							
	U25MCC05	Biology for Engineers \$							
Total									6

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

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



## SEMESTER I

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

## PRE-REQUISITES:

- - Nil -

## 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	-	-

## SYLLABUS:

## 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

## LEARN BEYOND CONTENT:

- Readathon – Reading online articles – Book Review

## 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

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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

## PRE-REQUISITES:

- - Nil -

## 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	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 5	3	2	-	2	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

**LEARN BEYOND CONTENT:**

- Population dynamics (ODEs) – Heat and wave propagation (PDEs) – Multivariable optimization problems (Lagrange multipliers)

**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



## SEMESTER I

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

## PRE-REQUISITES:

- - Nil -

## 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: Evaluate stress-strain relationships, modulus of elasticity, and bending moment to analyze mechanical behavior of solids and structures	Evaluate
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 concepts in semiconductors and devices such as Hall effect sensors and Schottky diodes	Apply
CO 5: Practice the principles of laser and fiber optics in industrial and medical applications	Apply

## CO - PO MAPPING:

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

## 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

  
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**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

**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 – CO<sub>2</sub> 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

**LEARN BEYOND CONTENT:**

- Torsional Pendulum – Hologram – Fiber optics communication system

**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

## PRE-REQUISITES:

- - Nil -

## 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:	Describe the structure, synthesis, and functions of conductive and smart polymers in electronics	Understand
CO 2:	Solve corrosion processes by suggesting appropriate surface protection and coating methods	Apply
CO 3:	Apply basic photochemical and electrochemical concepts to energy device	Apply
CO 4:	Interpret the materials and mechanisms used in displays, sensors and smart sensing devices	Apply
CO 5:	Explain the wafer fabrication processes and advanced materials for micro/nanoelectronics	Understand

## CO - PO MAPPING:

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

## 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

## 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

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

Batteries – Classification, Fabrication & working – Li-polymer,  $\text{LiFePO}_4$  – 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,  $\text{SF}_6$ ) – 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 ( $\text{Cu}^{2+}$ ) or nickel ( $\text{Ni}^{2+}$ ) 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

**LEARN BEYOND CONTENT:**

- Preparation of biodegradable plastic
- Polymer composites preparation from waste polymeric materials
- Electroplating of copper on metallic objects
- Electroless Ni plating on objects
- Electrolysis of water with generation of hydrogen
- Fabricate a working model of a dye-sensitized solar cell (DSSC) using nanocrystalline  $\text{TiO}_2$ , natural dye (such as anthocyanin from blackberries/hibiscus/tea), and measure its photovoltaic performance
- Chemical etching of a metal foil – Lithography mimic
- Demonstration of Czochralski Crystal Growth using sugar or alum


**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
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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## 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

## PRE-REQUISITES:

- - Nil -

## 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 arrays and strings for basic data processing	Apply
CO 3:	Apply functions, recursion, and pointers for efficient problem-solving	Apply
CO 4:	Apply structures, unions, 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:

Particular	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	2	-
CO 3	3	2	1	1	-	-	-	-	-	-	2	1	-
CO 4	3	2	1	1	-	-	-	-	-	-	2	1	-
CO 5	3	2	1	1	1	-	-	-	-	-	2	2	-

## SYLLABUS:

## UNIT I: C PROGRAMMING BASICS

6 + 12

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

  
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**UNIT II: ARRAYS AND STRINGS****6 + 12**

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

**UNIT III: FUNCTIONS AND POINTERS****6 + 12**

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 + 12**

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 + 12**

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

**LEARN BEYOND CONTENT:**

- Memory Management and Optimization

**CONTACT PERIODS:**

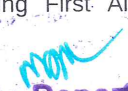
**Lecture:** 30 Periods      **Tutorial:** - Periods      **Practical:** 60 Periods      **Project:** - Periods      **Total:** 90 Periods

**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

  
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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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## SEMESTER I

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

## PRE-REQUISITES:

- - Nil -

## 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 smart 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	2	-
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

  
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**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

**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

**LEARN BEYOND CONTENT:**

- Case Study of Digital Technologies of Real time application

**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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## SEMESTER I

U25EC101	Electronics Engineering Studio	Category: PCC				
		L	T	P	J	C
		1	0	4	0	3

## PRE-REQUISITES:

- - Nil -

## COURSE OBJECTIVES:

- Introduce the evolution and basics of electronics and communication
- Explore modern ECE applications across various sectors
- Develop practical skills with PCB design, embedded projects, and emerging technologies

## COURSE OUTCOMES:

CO 1:	Describe the key historical milestones in electronics and communication engineering	Understand
CO 2:	Explain the evolution of communication and semiconductor technologies	Understand
CO 3:	Explain the role of ECE in different sectors	Understand
CO 4:	Design and fabricate PCBs, perform soldering, and develop simple embedded system projects	Apply
CO 5:	Demonstrate IoT and drone technology applications through hands-on experiments and field visits	Apply

## CO - PO MAPPING:

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

## SYLLABUS:

## UNIT I: HISTORICAL MILESTONES

5 + 20

Key Technological Breakthroughs in Electronics Field and Semiconductor Technology – Evolution of Communication Systems – Advancements in Network Systems with reference to Bandwidth and Frequency

## UNIT II: EMERGING TRENDS IN ELECTRONICS

5 + 20

Healthcare and Biomedical Applications – Automotive and Transportation Systems – Space and Defence – Agriculture and Environmental Monitoring – Smart Cities and Infrastructure

## UNIT III: EMERGING TRENDS IN COMMUNICATION SYSTEMS

5 + 20

6G and 7G Communication Systems – Non-Terrestrial Networks – Satellite Communication Systems – LEO, MEO and GEO Satellites

## LIST OF EXPERIMENTS

1. PCB Design using ECAD Software

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2. PCB Fabrication Process
3. Soldering Techniques and Practice
4. Simple Projects Using Embedded Controller for Beginners
5. Fundamentals of Drone Technology
6. Industrial and Research Field Visits

**LEARN BEYOND CONTENT:**

- Introduction to Arduino

**CONTACT PERIODS:**

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

**TEXTBOOKS:**

1. Albert Malvino and David J. Bates, Electronic Principles, McGraw Hill Education, 7th edition, 2017

**REFERENCES:**

1. George Kennedy and Bernard Davis, Electronic Communications Systems, McGraw Hill Education, 4th Edition, 2000
2. V.K. Mehta and Rohit Mehta, Principles of Electronics, S Chand & Company Limited, 2022

  
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## SEMESTER I

U25LEG01	Deutsch für Ingenieure – German I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

## PRE-REQUISITES:

- - Nil -

## 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

U25LEG02	Nihongo no Enginia – Japanese I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

## PRE-REQUISITES:

- Nil -

## 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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## SEMESTER I

U25LEG03	Français pour les Ingénieurs – French I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

## PRE-REQUISITES:

- - Nil -

## 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)

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**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

**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

## PRE-REQUISITES:

- - Nil -

## 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, "Prathamik 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

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

## PRE-REQUISITES:

- - Nil -

## 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

  
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**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

**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. Schumacher, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain, 1973

  
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## SEMESTER I

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

## PRE-REQUISITES:

- Nil -

## 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 Thina 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, Yash and Nadhaswaram – Role of Temples in Social and Economic Life of Tamils

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**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

**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. Priyadarshini, 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 II

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

## PRE-REQUISITES:

- - Nil -

## 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	-	-

## SYLLABUS:

## 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

## LEARN BEYOND CONTENT:

- TED Talks – Podcast creation – Peer Interview

## 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:

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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

U25MA203	Linear Algebra and Complex Variables (Common to BM, EC)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

## PRE-REQUISITES:

- Nil -

## COURSE OBJECTIVES:

- To introduce the concepts of linear algebra and complex analysis relevant to engineering systems
- To apply matrix methods and complex techniques in solving engineering problems
- To develop analytical skills for modeling and analyzing engineering systems using linear algebra and complex variables

## COURSE OUTCOMES:

CO 1:	Understand vector spaces and linear transformations in engineering contexts	Understand
CO 2:	Apply matrix operations and eigenvalue analysis to engineering systems	Apply
CO 3:	Utilize complex variables and functions in solving engineering problems	Apply
CO 4:	Apply and solve systems of linear equations relevant to engineering applications	Apply
CO 5:	Model and simulate engineering systems using linear algebra and complex analysis techniques	Apply

## CO - PO MAPPING:

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

## SYLLABUS:

## UNIT I: VECTOR SPACES AND LINEAR TRANSFORMATIONS

6 + 6

Definition and examples – Linear combinations – Span – Linear independence – Basis and dimension – Linear transformations – Kernel and range – Applications in engineering systems

## UNIT II: MATRICES AND EIGENVALUE ANALYSIS

6 + 6

Matrix operations – Determinants – Inverse and transpose – Rank – Eigenvalues and eigenvectors – Diagonalization – Applications to engineering systems

## UNIT III: COMPLEX VARIABLES AND FUNCTIONS

6 + 6

Complex numbers – Functions of a complex variable – Analytic functions – Cauchy-Riemann equations – Conformal mapping – Applications in engineering

## UNIT IV: SYSTEMS OF LINEAR EQUATIONS

6 + 6

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

**UNIT V: SIMULATIONS USING LINEAR ALGEBRA AND COMPLEX ANALYSIS****6 + 6**

Modeling engineering systems using linear algebra – Simulation using complex analysis techniques – Case studies and applications

**LIST OF EXPERIMENTS**

1. Vector Spaces and Linear Transformations – Visualize vector spaces and subspaces – Implement linear transformations and analyze their effects
2. Matrices and Eigenvalue Analysis – Perform matrix operations and compute eigenvalues/eigenvectors – Apply diagonalization to engineering problems
3. Complex Variables and Functions – Plot complex functions and analyze their properties – Implement conformal mappings and explore applications
4. Systems of Linear Equations – Solve systems using Gaussian elimination and LU decomposition – Apply solutions to engineering case studies
5. Modeling and Simulation – Develop models of engineering systems using linear algebra and complex analysis – Simulate and analyze system behavior

**LEARN BEYOND CONTENT:**

- Nonlinear filters in ECG signal processing – Phasor – based reconstruction

**CONTACT PERIODS:**

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

**TEXTBOOKS:**

1. David C. Lay, Linear Algebra and Its Applications, 5th Edition, Pearson Education, 2015
2. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications, 9th Edition, McGraw-Hill Education, 2013

**REFERENCES:**

1. Gilbert Strang, Introduction to Linear Algebra, 5th Edition, Wellesley Cambridge Press, 2016
2. Dennis G. Zill and Patrick D. Shanahan, A First Course in Complex Analysis with Applications, 3rd Edition, Jones & Bartlett Learning, 2011
3. Howard Anton and Chris Rorres, Elementary Linear Algebra: Applications Version, 11th Edition, Wiley, 2013

  
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## SEMESTER II

U25PH206	Materials Science for Electronics Engineering	Category: BSC				
		L	T	P	J	C
		2	0	0	2	3

## PRE-REQUISITES:

- - Nil -

## COURSE OBJECTIVES:

- To understand the classification of materials and their electrical, dielectric, thermal, and optical properties for applications in communication device
- To examine the principles and applications of piezoelectric, pyroelectric, magneto-resistive materials, nano scale materials and optoelectronic devices and emerging materials for next-generation flexible electronics and medical devices
- To Summarize the relationship between electronic band structures and semiconductor doping, and classify the role of quantum effects in modern spin-based chip technologies

## COURSE OUTCOMES:

- CO 1:** Classify and analyze material based on their electrical, dielectric, thermal, and optical properties for applications in communication devices **Analyze**
- CO 2:** Apply the principles of optoelectronic devices and emerging materials to solve engineering problems in flexible electronics and power devices **Apply**
- CO 3:** Demonstrate spintronic device operation, while implementing quantum tunneling concepts in nanoelectronics systems **Apply**
- CO 4:** Construct sensors for temperature, pressure, motion, and light detection in robotics and IoT systems **Apply**
- CO 5:** Implement quantum materials in nanoelectronics, and use conductive polymers/ biocompatible nanocomposites for antenna and medical device 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
CO 2	3	2	-	-	2	-	-	-	-	-	-	1	-
CO 3	3	2	1	-	2	-	-	-	-	-	-	1	-
CO 4	3	-	1	-	2	-	-	-	-	-	-	1	-
CO 5	3	-	1	-	-	-	-	-	-	-	-	-	3

## SYLLABUS:

## UNIT I: CLASSIFICATION OF MATERIALS

6 + 6

Conductors, semiconductors, and insulators – Material Categories: ceramics, polymers, and composites – Electrical, dielectric, thermal, and optical properties for communication devices –Material selection for ICs, PCBs, antennas, sensors, and high-frequency components

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

Transparent Conducting Oxides – Nonlinear Optical materials – Light Emitting Diode – Photodetectors (Si, InGaAs) – Emerging Materials & Applications: 2D materials (graphene, TMDCs) for flexible electronics – Wide-bandgap semiconductors (SiC, GaN) for power devices

**UNIT III: TRANSISTOR AND CHIPS****6 + 6**

Overview of transistors – Charge transport and electronic band structures – Semiconductor doping – Charge hopping, excitation, and quantum tunnelling – Spintronics fundamentals and spin-based devices in chip technology – nano electronic systems – Tunnel FETs

**UNIT IV: MATERIALS FOR SENSORS AND APPLICATIONS****6 + 6**

Piezoelectric materials – Pyroelectric materials – Electroactive polymers – Magneto-resistive and shape memory alloys – Applications of sensors in temperature, pressure, motion, and light detection in robotics – IoT and automation

**UNIT V: ADVANCED FUNCTIONAL MATERIALS****6 + 6**

Nanostructured Materials – Materials for Antennas: High-conductivity metals and composites for traditional designs – Flexible conductive polymers – Biomaterials: biocompatibility – Polymers nanocomposites used in medical electronics

**LIST OF PROJECTS**

1. Material Selection for a Communication Device (PCB or Antenna)
2. Comparative Analysis: Conductors, Semiconductors, and Insulators
3. Interactive Chart: Electrical, Dielectric, and Optical Properties
4. Flexible Electronics Demo with Graphene/2D Materials (Conceptual)
5. Design of a Simple LED Photodetector Circuit
6. TCO vs. Traditional Conductors in Displays (Research Project)
7. Build a Simple Transistor-Based Amplifier
8. Quantum Tunneling and Tunnel FETs (Simulation or Animation)
9. Poster: Evolution from Classical Transistors to Spintronics
10. Build a Piezoelectric Sensor for Motion Detection
11. Thermal Sensing with Pyroelectric Materials
12. Smart Material Applications in Robotics (Conceptual Model)
13. Comparative Study: 0D vs. 1D vs. 2D Nanomaterials
14. Flexible Antenna Model Using Conductive Ink or Foil
15. Biocompatibility of Materials in Medical Electronics

**LEARN BEYOND CONTENT:**

- Neuromorphic Materials and Brain – Inspired Electronics – Sustainable and Eco – Friendly Materials for Electronics – Quantum Materials for Next – Generation Devices

**CONTACT PERIODS:**

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

**TEXTBOOKS:**


1. William D. Callister, Jr, David G. Rethwisch, "Materials Science and Engineering An Introduction", 10th edition, Wiley, 2017



2. Balasubramanian K, "Smart Materials and Sensors for Industrial Applications", IK International, 2016

**REFERENCES:**

1. R. P. Rana, S. K. Arya, "Electronic Materials and Processes", 5th edition, S. K. Kataria & Sons, New Delhi, 2020
2. V. K. Khanna, "Nanoelectronics: Devices and Circuits", 1st edition, McGraw Hill Education, New Delhi, 2020
3. D. K. Bhattacharya, "Sensors and Transducers", 2nd edition, New Age International, 2020
4. D. K. Bhattacharya, "Biomaterials and Medical Electronics", 1st edition, New Age International, 2023
5. <https://nptel.ac.in/courses/117102056>
6. <https://nptel.ac.in/courses/112106302>

  
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## SEMESTER II

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

## PRE-REQUISITES:

- - Nil -

## 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: Describe ecosystems functions and the importance of protecting biodiversity	Understand
CO 2: Analyze the atmospheric and hydrospheric issues such as pollution, climate change, and water crises using global and local case studies	Analyze
CO 3: Estimate land-related challenges, agriculture-related issues and waste management methods	Apply
CO 4: Assess the role of population, disaster management, and IT tools in addressing environmental and public health challenges	Apply
CO 5: Apply the concepts of sustainability, circular economy, green chemistry and energy efficiency in real-world scenarios and Sustainable Development Goals	Apply

## CO - PO MAPPING:

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

## 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)

  
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**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, Carbon Footprint and reduction strategies Hydrosphere – Hydrological Cycle – Water Quality Parameters, water pollution – Causes, effects, control measures, Overutilization of Ground Water – Water Conservation Strategies 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)

**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 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 – Floods, Landslides, Disaster management cycle, Land Clearing Projects – Dam sites, Highways projects, Resettlement and Rehabilitation (R&R) Population – Global and national growth patterns, Population explosion and its ecological footprint Role of Information Technology (IT) – Fundamentals of GIS, Open Sources GIS- QGIS, OSM (Open Series Map) – Use of IT in human health monitoring – Disease tracking and prediction using big data and AI (e.g., COVID-19 apps), Health information systems – Telemedicine, electronic health records (EHRs) 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 Agriculture, Sustainable Energy – Biofuels, low-impact renewable energy, Concepts of carbon credits and emissions trading 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. Determination of molecular weight and degree of polymerisation of a given polymer using an Ostwald Viscometer
2. Estimation of hardness (total, temporary, permanent) in water samples
3. Iodometric determination of available chlorine in a sample of bleaching powder
4. Monitoring of air quality using sensors
5. Estimation of dissolved oxygen in water
6. Determination of soil moisture content and water holding capacity of soil
7. Recovery of aluminium from waste materials
8. Photocatalytic degradation of dye using  $\text{TiO}_2$
9. Synthesis of biodiesel from vegetable oil

**LEARN BEYOND CONTENT:**

- Mapping Indian biodiversity hotspots using GIS tools or visual mapping software
- Determination of Particulate Matter emissions from stationary sources

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**B.E. - EC - R2025 - CBCS**

- Measurement of noise levels in different environments using a dosimeter
- Life Cycle Assessment (LCA) experiment: Compare traditional vs green products (energy, materials, emissions)
- Coir pith composting and application study
- Field survey and GPS-based mapping of waste dump sites or urban agriculture sites
- Simulation of disaster management cycle (Preparedness → Response → Recovery → Mitigation)
- Carbon footprint calculator activity for individual or institutional ecological footprint

**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
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

## PRE-REQUISITES:

- - Nil -

## 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:

<b>CO 1:</b>	Understand basic Python syntax, data types, and debugging using script and interactive modes	Understand
<b>CO 2:</b>	Develop programs using conditionals, loops, functions, recursion, and apply appropriate variable scopes	Apply
<b>CO 3:</b>	Implement object-oriented concepts and manipulate Python collections using slicing, aliasing, and comprehension	Apply
<b>CO 4:</b>	Perform file operations, handle exceptions, and manage modules, packages, and dependencies in Python	Apply
<b>CO 5:</b>	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	-	-	-	-	-	-	-	-	-	-	-
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: OBJECT-ORIENTED PROGRAMMING AND CORE DATA STRUCTURES

6 + 6

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

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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, Vectorised operations – Pandas: Series and Data frames – Reading and writing files, Data filtering, Sorting, Merging and Grouping, Reshaping – Data cleaning and transformation – Visualisations: Matplotlib, Seaborn, and Streamlit – Case studies: Exploratory Data Analysis (EDA) for Real-World problems

**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. Data Analysis and Visualization Using NumPy, Pandas, and Matplotlib
10. Developing Web-Based Interfaces Using Streamlit for Interactive Data Applications

**LEARN BEYOND CONTENT:**

- Building a Real-World Data-Driven Web Application with Python

**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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## 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

## PRE-REQUISITES:

- - Nil -

## 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	-	-
CO 2	3	2	1	-	-	-	-	-	-	-	1	-	-
CO 3	3	2	1	-	-	-	-	-	-	-	1	-	-
CO 4	3	2	1	-	-	-	-	-	-	-	1	-	-
CO 5	3	2	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 Modelling (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

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**B.E. - EC - R2025 - CBCS**

4. Impact Test on aggregates
5. Determination of Specific gravity of soil solids
6. Study on Centre line marking for building components - Foundations

**LEARN BEYOND CONTENT:**

- Study of Building Drawings

**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

U25EEG01	Basics of Electrical Engineering (Common to AD, AM, BM, CB, CE, CS, EC, IT, SC)	Category: ESC				
		L	T	P	J	C
		1	0	2	0	2

## PRE-REQUISITES:

- - Nil -

## COURSE OBJECTIVES:

- To introduce the fundamentals of electric circuits, power systems, and basic electrical measurements
- To provide an understanding of electrical machines and SMPS with relevance to computing applications
- To create awareness of electrical installations, safety practices, and protective systems in practical environments

## COURSE OUTCOMES:

CO 1:	Analyse basic electrical circuits using Ohm's and Kirchhoff's laws	Analyze
CO 2:	Measure electrical quantities using appropriate instruments	Understand
CO 3:	Explain the working principles and applications of Electrical Machines and SMPS	Understand
CO 4:	Identify the components of residential electrical installations	Apply
CO 5:	Apply electrical safety procedures and identify protective devices used in electrical systems	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	-	-
CO 3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO 4	3	2	-	-	-	-	-	-	-	-	2	-	-
CO 5	3	2	-	-	-	-	-	-	-	-	2	-	-

## SYLLABUS:

## UNIT I: FUNDAMENTALS OF ELECTRIC CIRCUITS AND MEASUREMENTS

5 + 10

Ohm's Law, Kirchhoff's Laws (KVL, KCL) – Series and parallel circuits, voltage and current division – Introduction to AC and DC supply – Power, energy, and power factor – Basic measuring instruments: Voltmeter, Ammeter, Wattmeter, Energy Meter

## UNIT II: ELECTRICAL MACHINES AND POWER CONVERSION DEVICES

5 + 10

Single Phase Transformer, DC Machines and Three Phase Induction Motor: Working principle, types, and applications – Stepper and Servo motors: Basics and applications – Switched Mode Power Supply: concept, types (buck, boost, buck-boost), and applications

## UNIT III: ELECTRICAL INSTALLATIONS AND SAFETY

5 + 10

Components of a simple electrical installation – Earthing, Fuses, MCB, ELCB – Single-line diagram of a residential system – Introduction to batteries, UPS and inverters – Electrical safety measures and shock preventions

## LIST OF EXPERIMENTS

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**B.E. - EC - R2025 - CBCS**

1. Verification of Ohm's Law and Kirchhoff's Laws
2. Measurement of voltage, current, and power in DC circuits
3. Load test on a single-phase transformer
4. Speed control of DC motor
5. Starting and reversal of direction of a three-phase induction motor
6. Demonstration of SMPS and UPS operation

**LEARN BEYOND CONTENT:**

- -

**CONTACT PERIODS:**

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

**TEXTBOOKS:**

1. D.P. Kothari and I.J. Nagrath, "Basic Electrical Engineering", 4th edition, Tata McGraw Hill, 2024
2. V.K. Mehta & Rohit Mehta, "Principles of Electrical Engineering and Electronics", 2nd revised edition, S. Chand, 2019

**REFERENCES:**

1. D.P. Kothari and I.J. Nagrath, "Basic Electrical and Electronics Engineering", 2nd edition, Tata McGraw Hill, 2020
2. M.H. Rashid, "Power Electronics: Circuits, Devices and Applications", 4th edition, Pearson Education, 2023
3. Hughes, "Electrical and Electronic Technology", Pearson Education, 12th edition, 2016

  
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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

## PRE-REQUISITES:

- Nil -

## 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	3	2	-	-	-	1	-	-	-	-	-	-	-
CO 2	3	2	-	-	-	1	-	-	-	-	-	-	-
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 4	3	2	-	-	-	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 + 8

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 + 8

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

Engines – IC engines – Petrol and diesel engines, two stroke and four stroke engines – General layout of electric vehicle – Power plant – Working – Thermal power plant, nuclear power plant, gas power plant – Renewable energy – Solar, wind, tidal, OTEC

**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. Perform step turning operation on a lathe machine
4. Perform drilling operation on drilling machine
5. Demonstrate the working of 3D printer by printing a simple object
6. Determination of heat transfer coefficient under natural convection from vertical cylinder
7. Verification of Bernoulli's theorem
8. Performance characteristics of a centrifugal pump
9. Determination of port timing of two-stroke engine
10. Determination of valve timing of four-stroke engine

**LEARN BEYOND CONTENT:**

- Industrial Safety

**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

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

## PRE-REQUISITES:

- Nil -

## 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:** Understand and apply BIS standards in the construction of engineering curves Understand
- CO 2:** Apply the principles of orthographic projection to represent points, straight lines, plane surfaces, and solids Understand  
on engineering drawing sheets
- CO 3:** Construct projections of truncated and frustums solids and develop the lateral surfaces of solids Understand
- CO 4:** Translate isometric views of simple objects to orthographic views and convert the orthographic views into Understand  
isometric projections

## 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	-	-

## SYLLABUS:

## LIST OF EXPERIMENTS

- 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)
- Manual construction of ellipse, parabola, and hyperbola by eccentricity method
- Construction of involute of square and circle by manual drafting
- Projection of points in all four quadrants by manual drafting
- Projection of lines inclined to both horizontal and vertical planes by manual drafting
- Projection of planes inclined to both horizontal and vertical planes by manual drafting
- Projection of solids inclined to one plane and parallel to other planes using AUTOCAD

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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

**LEARN BEYOND CONTENT:**

- Perspective Projection

**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

U25EC201	Electronic Devices and Circuits	Category: PCC				
		L	T	P	J	C
		2	0	2	0	3

## PRE-REQUISITES:

- Nil -

## COURSE OBJECTIVES:

- To learn the fundamentals of semiconductor devices
- To familiarize the application of diode and transistor
- To analyze the frequency response of transistor amplifier

## COURSE OUTCOMES:

CO 1:	Explain the fundamentals of semiconductor devices	Understand
CO 2:	Construct electronic circuits using the PN junction diode for various applications	Apply
CO 3:	Demonstrate the input and output characteristics of BJT and JFET	Apply
CO 4:	Apply suitable biasing methods for amplifier	Apply
CO 5:	Analyze the frequency response of CE amplifier	Analyze

## 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	2	-	2	2	-	-	2	2	2	-	1	-
CO 3	3	2	-	2	-	-	-	2	2	2	-	1	-
CO 4	3	2	-	2	-	-	-	2	2	2	-	1	-
CO 5	3	3	2	2	2	-	-	2	2	2	-	1	-

## SYLLABUS:

## UNIT I: SEMICONDUCTOR FUNDAMENTALS

6 + 6

Introduction to semiconductors – Conductivity of semiconductors – Law of mass-action – Variation in semiconductor parameters with temperature – Drift and diffusion current – PN junction diode and Zener diode

## UNIT II: DIODE APPLICATIONS

6 + 6

Rectifiers – Half wave and full wave rectifier circuits – LC filters – Voltage regulators – Positive and negative Clippers and Clampers

## UNIT III: BJT AND FET

6 + 6

NPN and PNP Transistors – Early effect – Input and output characteristics of CE configuration – Characteristics of JFET and MOSFET

## UNIT IV: BIASING METHODS OF AMPLIFIERS

6 + 6

DC and AC load lines – Biasing methods – Stability analysis – Frequency response of CE and CS amplifiers

**UNIT V: FREQUENCY ANALYSIS OF BJT AMPLIFIERS**

h-parameter transistor model – Small signal analysis of CE amplifier – Miller effect – High frequency analysis of CE amplifiers

**LIST OF EXPERIMENTS**

1. VI characteristics of PN diode and Zener diode
2. Applications of PN diode
3. Characteristics of BJT and JFET
4. Frequency response of CE and CS amplifiers
5. Design of wave shaping circuits using simulation tool.
6. Design of DC regulator power supply
7. Design of low frequency audio amplifier

**LEARN BEYOND CONTENT:**

- BJT configuration : CC and CB
- FET configuration : CG and CD

**CONTACT PERIODS:****Lecture:** 30 Periods**Tutorial:** - Periods**Practical:** 30 Periods**Project:** - Periods**Total:** 60 Periods**TEXTBOOKS:**

1. Donald A Neaman, "Semiconductor Physics and Devices", 4th edition, Tata McGraw–Hill Inc. 2012
2. S. Salivahanan, N.Sureshkumar, A. Vallavaraj, "Electronic Devices and Circuits", 3rd edition, Tata McGraw–Hill Inc., 2010

**REFERENCES:**

1. Yang, "Fundamentals of Semiconductor devices", 1st edition, McGraw Hill International, 2017
2. Jacob Millman, Christos C Halkias, Satyabrata Jit, "Electronic Devices and Circuits", 4th edition, McGraw Hill India, 2015
3. Robert Boylestad and Louis Nashelsky, "Electron Devices and Circuit Theory", 11th edition, Pearson Prentice Hall, 2014
4. R.S.Sedha, "A Text Book of Applied Electronics", 3rd edition, S. Chand Publications, 2006

  
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## SEMESTER II

U25LEG05	Deutsch für Ingenieure – German II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

## PRE-REQUISITES:

- - Nil -

## 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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## SEMESTER II

U25LEG06	Nihongo no Enginia – Japanese II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

## PRE-REQUISITES:

- - Nil -

## 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

**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

## SEMESTER II

U25LEG07	Français pour les Ingénieurs – French II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

## PRE-REQUISITES:

- - Nil -

## 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

## SEMESTER II

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

## PRE-REQUISITES:

- - Nil -

## 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



**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 – Question 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, "Prathamik 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

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 ENCOMPASSING6 + RESOLUTION 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	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	0	0	1

## PRE-REQUISITES:

- - Nil -

## 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 beads – 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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## SEMESTER I &amp; II

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

## PRE-REQUISITES:

- - Nil -

## 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	-	-
CO 2	1	2	3	2	-	-	-	-	1	1	1	-	-
CO 3	1	2	3	2	-	-	-	-	1	1	1	-	-
CO 4	1	2	3	2	-	-	-	-	1	1	1	-	-
CO 5	1	2	3	2	-	-	-	-	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 EMPATHIZE 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

**LEARN BEYOND CONTENT:**

- Design Thinking for Digital Transformation

**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 &amp; II

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

## PRE-REQUISITES:

- Nil -

## COURSE OBJECTIVES:

- To introduce the basic structure and functioning of computer systems, including hardware, software, operating systems and file management
- To develop an understanding of fundamental computing concepts such as data types, variables, operators, logic gates 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

## COURSE OUTCOMES:

- CO 1:** Describe the fundamental components of a computer system and explain the role of operating systems and file management in computing Understand
- CO 2:** Apply basic computational concepts such as data types, variables, operators, algorithms, and logic gates to solve simple problems Apply
- CO 3:** Develop simple programs using input/output operations, control structures, arrays, and strings in the C language 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	3	2	2	-	-	-	-	-	-	2	-	-
CO 3	3	3	3	-	2	2	-	-	-	-	2	-	-

## SYLLABUS:

## UNIT I: INTRODUCTION TO COMPUTERS

3 + 10

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

## UNIT II: FUNDAMENTALS OF COMPUTING

6 + 10

Introduction to algorithms and flowcharts – Overview of Logic gates and basic digital circuits – Data types, variables, and operators

## UNIT III: INTRODUCTION TO PROGRAMMING

6 + 10

Programming languages overview – Input/output, conditional statements, loops – Basic data structures: arrays and strings

## LIST OF EXPERIMENTS

- Identifying computer components

  
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2. Installation and debugging of the Operating System
3. Programs using variables and data types
4. Programs using Conditional Statements
5. Programs using Loops and Iterations
6. Program using Nested Loops & Pattern Printing

**LEARN BEYOND CONTENT:**

- Introduction to Debugging and IDEs

**CONTACT PERIODS:**

**Lecture:** 15 Periods      **Tutorial:** - Periods      **Practical:** 30 Periods      **Project:** - Periods      **Total:** 45 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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## SEMESTER I &amp; II

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

## PRE-REQUISITES:

- - Nil -

## 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	1	1	-	-	-	-	-	-	-	-	1	-	-
CO 2	1	1	-	-	-	-	-	-	-	-	1	-	-
CO 3	1	1	-	-	-	-	-	-	-	-	1	-	-
CO 4	1	2	2	1	-	-	-	1	2	1	1	-	-
CO 5	1	2	2	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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**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

**LEARN BEYOND CONTENT:**

- Lab-on-a-Chip

**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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