KPR Institute of Engineering and Technology

Learn Beyond

(Autonomous, Affiliated to Anna University)

CURRICULUM AND SYLLABI
REGULATIONS – 2025

Department of
Artificial Intelligence and Machine Learning

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

Mission

The mission of the department is to

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

III. Program Educational Objectives (PEOs)

The Program Educational Objectives (PEOs) of the COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) (AM) represent major accomplishments that the graduates are expected to achieve after three to five years of graduation.

PEO1: Graduates will be globally competent in the field of artificial intelligence and machine learning to identify new opportunities through value-based education

PEO2: Graduates will adopt new technologies to solve real-world problems with ethical practices to enhance their own performance and contribute to society

PEO3: Graduates will have the potential to participate in lifelong learning in order to fulfil their goals and successful professionals in academia, industry, research, and consultancy

IV. Program Outcomes (POs)

Graduates of the COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) 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)

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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 COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) will be able to

PSO1: Design and develop an intelligent automated system applying fundamental knowledge from mathematical, analytical programming and operational skills to solve the arising problems in the field of technology.

PSO2: Efficiently apply machine learning techniques to fit various business situations.

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	2	2	2	3	2	3	3	3	3
PEO 2	3	3	3	3	1	2	2	2	2	3	3	2	2
PEO 3	3	3	3	3	3	2	2	1	2	1	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	✓	✓	-	-	-	-	-	-	-	-	-	-	-
	Chemistry for Computer Science	✓	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
	Problem Solving using C Programming	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓	-
	Digital Technologies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Computer Assembly and Maintenance	✓	✓	✓	✓	-	-	-	-	-	-	✓	✓	✓
	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 for Data Science and Machine Learning	✓	✓	-	✓	✓	-	-	-	-	-	-	✓	✓
	Applied Physics	✓	✓	-	-	-	-	-	-	-	-	-	-	-
	Environmental Science and Sustainability	✓	✓	✓	✓	✓	✓	✓	-	✓	-	✓	-	-
	Computational Problem Solving using Python	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓	✓

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Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
	Basics of Mechanical Engineering	✓	✓	-	-	-	✓	-	-	-	-	-	-	-
	Basics of Electrical Engineering	✓	✓	-	-	-	-	-	-	-	-	✓	-	-
	Basics of Electronics Engineering	✓	✓	✓	-	-	-	-	✓	✓	✓	-	-	-
	Basics of Civil Engineering	✓	✓	✓	-	-	-	-	-	-	-	✓	-	-
	Foundations of Artificial Intelligence	✓	✓	✓	-	✓	-	-	-	✓	-	-	✓	✓
	Linux and Shell Scripting Laboratory	✓	✓	✓	-	✓	-	-	-	✓	-	-	-	-
	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	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	✓	-

COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)
Regulations 2025
For the students admitted from 2025 onwards
CHOICE BASED CREDIT SYSTEM
CURRICULUM FOR I - VIII SEMESTERS
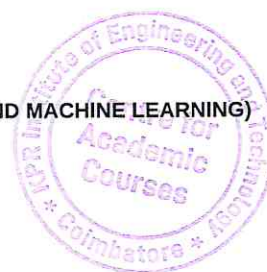
SEMESTER I

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	U25CY101	Chemistry for Computer Science	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	U25CSG04	Computer Assembly and Maintenance	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	U25MA202	Linear Algebra for Data Science and Machine Learning	BSC	TwL	2	-	2	-	3
3	U25PH202	Applied Physics	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 U25ECG01 U25EEG01 U25MEG02	Basics of Civil Engineering Basics of Electronics Engineering Basics of Electrical Engineering Basics of Mechanical Engineering	ESC	TwL	1	-	2	-	2

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No	Course Code	Title	Category	Type	L	T	P	J	C
7	U25AM201	Foundations of Artificial Intelligence	ESC	T	3	-	-	-	3
8	U25AM202	Linux and Shell Scripting Laboratory	ESC	L	-	-	4	-	2
9	U25LEG05 U25LEG06 U25LEG07 U25LEG08	Deutsch für Ingenieure – German II Nihongo no Enginia – Japanese II Français pour les Ingénieurs – French II Hindi for Engineers - II	HSMC	TwL	1	-	2	-	2
		Total							21
	MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)								
10	U25MCC06	Universal Human Values II	MCC	MCC	2	1	-	-	3
11	U25MCC07	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	MCC	Tamil Courses	1	-	-	-	1
12	U25MCC03 U25MCC04 U25MCC05	Design Thinking Computer Fundamentals and Coding Essentials @ Biology for Engineers $	MCC	MCC	1	-	2	-	2
		Total							6

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

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

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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

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, **Understand** and the Taylor series for multiple variables, to solve engineering problems

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

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

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

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

CO - PO MAPPING:

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

SYLLABUS:

UNIT I: MULTIVARIABLE CALCULUS

6 + 6

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

UNIT II: MULTIPLE INTEGRALS AND APPLICATIONS

6 + 6

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

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UNIT III: VECTOR CALCULUS   6 + 6

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

UNIT IV: ORDINARY DIFFERENTIAL EQUATIONS   6 + 6

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

UNIT V: PARTIAL DIFFERENTIAL EQUATIONS   6 + 6

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

LIST OF EXPERIMENTS

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

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

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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_2 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

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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

U25CY101	Chemistry for Computer Science (Common to AD, AM, CB, CS, IT, SC)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- - Nil -

COURSE OBJECTIVES:

- To describe the properties, classifications and engineering applications of polymeric materials
- To explain the different materials used in energy storage devices, display screens, sensors, and the processes involved in making semiconductor wafers
- To provide a strong conceptual foundation in quantum chemistry and computational methods

COURSE OUTCOMES:

CO 1:	Describe the structure, synthesis, and functional behavior of polymers used in electronic applications	Understand
CO 2:	Apply basic photochemical and electrochemical concepts to energy device	Apply
CO 3:	Interpret the materials and mechanisms used in displays, sensors and smart sensing devices	Apply
CO 4:	Explain the wafer fabrication processes and advanced materials for micro/nanoelectronics	Understand
CO 5:	Apply the concepts of quantum chemistry using computational methods to model and visualize the materials	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	2	1	-	-	-	-	-	-	-	2	-	-
CO 2	3	3	1	-	-	-	-	-	-	-	2	-	-
CO 3	3	2	1	-	-	-	-	-	-	-	2	-	-
CO 4	2	3	2	-	1	-	-	-	-	-	1	-	-
CO 5	3	2	2	-	2	1	-	-	-	-	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: ENERGY CONVERSION AND STORAGE   6 + 6

Batteries – Classification, Fabrication & working – Li-polymer, LiFePO$_4$ – Fuel Cells (Proton Exchange Membrane, Solid Oxide Fuel Cell, Microbial Fuel Cells) and Green Hydrogen Technologies – Laws of Photochemistry – Jablonski Diagram, Solar Cells – Dye-Sensitized Solar Cells, Supercapacitors – Electrostatic Double Layer, Pseudocapacitors, Hybrid Supercapacitors

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UNIT III: 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 IV: WAFER TECHNOLOGY   6 + 6

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

UNIT V: COMPUTATIONAL AND QUANTUM CHEMISTRY   6 + 6

Quantum Chemistry – Quantum numbers (n, l, m, s), Shapes and energy levels of atomic orbitals – Molecular Orbital Theory – (H_2, O_2, N_2), Schrödinger equation. Qubits and Quantum Memory – Introduction only. Quantum Computing in Chemistry – Molecular Docking – Basic components, steps, software, applications – Molecular Modeling and Visualization – Online Tools to visualize and manipulate molecular structures in 3D, Spectral simulation – UV and IR, Sustainability Modeling and Self-learning Tools – Carbon footprint estimation

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. Estimate the concentration of co pper (Cu^{2+}) or nickel (Ni^{2+}) in a given solution using colorimetric. analysis based on Beer-Lambert's law

4. Fabricate a working model of a dye-sensitized solar cell (DSSC) using nanocrystalline TiO_2, natural dye (such as anthocyanin from blackberries/hibiscus/tea), and measure its photovoltaic performance

5. Evaluate the strength of the given HCl by pH metry

6. Determine the concentration of Ferrous ions present in the given ferrous sulphate solution using potentiometric titration

7. Recover copper from waste printed circuit boards (PCBs) using chemical methods and estimate the amount of copper recovered using appropriate analytical techniques

8. Conduct molecular docking using AutoDock to analyze the binding interactions between the ligand and the target protein

LEARN BEYOND CONTENT:

- Preparation of biodegradable plastic
- Polymer composites preparation from waste polymeric materials
- Electrolysis of water with generation of hydrogen
- Potentiometric estimation of Fe present in corrosion medium
- Chemical etching of a metal foil – Lithography mimic
- Demonstration of Czochralski Crystal Growth using sugar or alum
- Sketch the 2D structure of an organic molecule and generate its 3D molecular model for visualization

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

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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

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. Ira N Levine, "Quantum Chemistry", 7th edition, Pearson, Boston, 2013

6. Patrick E McMahon, "Programming for Chemists: A Guided Approach for Beginners, Oxford University Press, New York, 2022

7. Sunita Rattan, "Experiments in Applied Chemistry", 3rd edition, S.K. Kataria & Sons, New Delhi 2021

8. Frank Jensen, "Introduction to Computational Chemistry", 3rd edition, Wiley, Chichester, 2017

9. M. Karthikeyan, R. Saravanan, P. Muthukumaran, H. Zhang, "Practical Chemoinformatics", 1st edition, Springer, India, 2014

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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	-	-	-	-	-	-	-	-	-	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: 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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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 sart systems, big data, and evolving digital landscapes
- To evaluate ethical implications of AI, data privacy, and societal impact of technologies

COURSE OUTCOMES:

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

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

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

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 **Understand** ethical considerations in AI

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

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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6

UNIT III: IOT, CLOUD, CYBERSECURITY ESSENTIALS

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

6

UNIT IV: DIGITAL INNOVATION AND AUTOMATION

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

6

UNIT V: DIGITAL DESIGN AND RESPONSIBILITY

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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U25CSG04	Computer Assembly and Maintenance (Common to AD, AM, CB, CS, IT, SC)	Category: PCC				
		L	T	P	J	C
		1	0	4	0	3

PRE-REQUISITES:

- - Nil -

COURSE OBJECTIVES:

- To introduce the fundamental components and architecture of personal computers
- To understand the role of BIOS, UEFI, and system software in hardware initialization and boot processes
- To explore device interfaces, drivers, and troubleshooting techniques for effective system maintenance

COURSE OUTCOMES:

CO 1: Describe the architecture and functions of key PC hardware components including memory types, CPU, **Understand** and motherboard

CO 2: Explain the role of BIOS/UEFI and system software in boot processes and hardware initialization **Understand**

CO 3: Apply troubleshooting techniques and manage device interfaces and drivers for effective system maintenance **Apply**

CO - PO MAPPING:

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

SYLLABUS:

UNIT I: PC HARDWARE COMPONENTS AND ARCHITECTURE   5 + 10

Overview of I/O systems – Types of memory: RAM (Static and Dynamic), ROM, PROM, EPROM, EEPROM – CPU architecture: ALU and Control Unit – Motherboard and processor fundamentals – Hard disk partitioning and disk defragmentation

UNIT II: BIOS AND SYSTEM SOFTWARE CONCEPTS   5 + 10

BIOS and UEFI: Functions and Architecture – Boot Process and Boot Loaders – System Firmware and its Role in Hardware Initialization – Differences between BIOS and UEFI –Introduction to Virtualization and Dual Boot Concepts

UNIT III: DEVICE INTERFACES AND TROUBLESHOOTING CONCEPTS   5 + 10

Types of External Interfaces: USB, HDMI, Audio Jacks, Ethernet – Device Drivers: Purpose, Types, and Management – Overview of Printer and Scanner Technologies – Understanding POST (Power-On Self Test) and Common Error Codes – Principles of Systematic Troubleshooting: Diagnostic Tools and Utilities

LIST OF EXPERIMENTS

1. Identification and Study of Basic PC Hardware Components
2. Identification and Study of Basic PC Hardware Components

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3. BIOS Setup and Boot Configuration

4. Creating a Bootable USB and Installing Windows OS

5. Installing Ubuntu OS and Configuring Dual Boot System

6. Assembling and Upgrading a PC System

7. Installing and Configuring Printers and Scanners

8. Setting Up External Devices and Peripherals

9. BIOS Update and Troubleshooting BIOS Issues

10. Diagnostic and Troubleshooting of PC Hardware Systems

LEARN BEYOND CONTENT:

- PC building simulator

CONTACT PERIODS:

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

TEXTBOOKS:

1. Jean Andrews, "A+ Guide to Hardware: Managing, Maintaining, and Troubleshooting", 6th Edition, Cengage Learning, 2013

2. Cisco Networking Academy, "IT Essentials: PC Hardware and Software Companion Guide", 2010

REFERENCES:

1. Craig Zacker, "PC Hardware: The Complete Reference ", McGraw-Hill Education, 2017

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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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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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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)

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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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, "Prathamic Text Book: New Syllabus," 1st Edition, Dakshina Bharat Hindi Prachar Sabha, Madras, 2023

REFERENCES:

1. Ganga, K., & Ramesh, V., "Learn Hindi in 30 Days: A Beginner's Guide," 3rd Edition, Hindi Academy, 2020

2. Vyas, S., "Spoken Hindi for Beginners," 1st Edition, Orient BlackSwan, 2018

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

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	தமிழர் மரபு / Heritage of Tamils	Category: MCC				
		L	T	P	J	C
U25MCC02	(Common to all programmes)	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 Thinai concepts, trade and victory of Chozha dynasty	Understand
CO 5:	Understand the contribution of Tamils in Indian freedom struggle, Self-esteem movement and siddha medicine	Understand

CO - PO MAPPING:

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

SYLLABUS:

UNIT I: LANGUAGE AND LITERATURE 3

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

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

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

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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. Priyadharshini, Heritage of Tamils, V. K. Publications

REFERENCES:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை, International Institute of Tamil Studies, C.P.T Campus, Chennai

2. கணினித் தமிழ் - முனைவர். இல. சுந்தரம், விகடன் பிரசுரம், அண்ணா சாலை, சென்னை, திசம்பர் 2016

3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, தமிழ்நாடு அரசு, சென்னை, ஆறாம் பதிப்பு 2020

4. Social Life of Tamils, Dr. K. K. Pillay, A joint publication of TNTB & ESC and RMRL (in print) University of Madras, Chennai, Second Edition 1975

5. The Contributions of the Tamils to Indian Culture, Dr.M.Valarmathi, International Institute of Tamil Studies, C.I.T Campus, Tharamani, Chennai, First Edition 1995

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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:

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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U25MA202	Linear Algebra for Data Science and Machine Learning (Common to AD, AM)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- - Nil -

COURSE OBJECTIVES:

- To introduce vector spaces, linear transformations, and eigenvalue problems relevant to data science and machine learning
- To apply matrix methods and linear algebra techniques in analyzing datasets and ML models
- To develop mathematical understanding of stability, dimensionality reduction, and feature transformations using linear algebra

COURSE OUTCOMES:

CO 1:	Understand vector spaces and subspaces in the context of data representation	Understand
CO 2:	Apply matrix operations and linear transformations for feature engineering and data transformations	Apply
CO 3:	Compute eigenvalues and eigenvectors for dimensionality reduction and stability analysis in ML models	Apply
CO 4:	Solve systems of linear equations for regression and optimization problems	Apply
CO 5:	Model and simulate linear ML algorithms using linear algebra techniques	Apply

CO - PO MAPPING:

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

SYLLABUS:

UNIT I: VECTOR SPACES AND SUBSPACES   6 + 6

Definition and examples – Linear combinations – Span – Linear independence – Basis and dimension – Applications in feature representation

UNIT II: MATRICES AND LINEAR TRANSFORMATIONS   6 + 6

Matrix operations – Inverse and transpose – Rank – Linear transformations – Kernel and range – Applications in dimensionality reduction and feature mapping

UNIT III: EIGENVALUES AND EIGENVECTORS   6 + 6

Characteristic equation – Diagonalization – Applications in PCA and clustering – Power method – Modal analysis of data

UNIT IV: SYSTEMS OF LINEAR EQUATIONS   6 + 6

Gaussian elimination – LU decomposition – Consistency and uniqueness – Applications in regression and optimization problems

UNIT V: MODELING USING LINEAR ALGEBRA   6 + 6

Sparse matrices – Graph representations of data – Applications in Markov chains, PageRank, and state – space models in ML

LIST OF EXPERIMENTS

1. Vector Spaces and Basis – Visualize subspaces in 2D/3D – Identify basis and compute dimension for datasets

2. Matrix Operations and Transformations – Perform linear transformations on images/data – Explore rank and kernel for dimensionality reduction

3. Eigenvalue Computations and Modal Analysis – Compute eigenvalues/eigenvectors of covariance matrices – Implement PCA for dimensionality reduction

4. Solving Linear Systems – Solve linear systems using Gaussian elimination – Compare with numerical libraries (NumPy, SciPy)

5. State-Space and Graph Models – Build graph-based data models (adjacency, incidence matrices) – Simulate PageRank / Markov chain transitions

LEARN BEYOND CONTENT:

- Nonlinear algebra in data – driven systems

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. Gilbert Strang, Introduction to Linear Algebra, 5th Edition, Wellesley Cambridge Press, 2016

REFERENCES:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer, 2009

2. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006

3. Stephen Boyd & Lieven Vandenberghe, Introduction to Applied Linear Algebra – Vectors, Matrices, and Least Squares, Cambridge University Press, 2018

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U25PH202	Applied Physics (Common to AD, AM, CB, CS, SC)	Category: BSC				
		L	T	P	J	C
		2	0	0	2	3

PRE-REQUISITES:

- - Nil -

COURSE OBJECTIVES:

- To understand the concepts of optical and optoelectronic materials and device applications
- To examine the principles and applications of optoelectronic devices and emerging materials for next-generation flexible electronics
- To understand the principles of quantum mechanics for computing and electronic circuits and to analyze next generation quantum electronics

COURSE OUTCOMES:

CO 1:	Analyze the functional behaviour and mechanism in Optoelectronic devices	Analyze
CO 2:	Examine the EM wave propagation in Dielectrics	Analyze
CO 3:	Apply the concepts in magnetism for memory devices and for sensor applications	Apply
CO 4:	Outline the quantum mechanical principles for computing process and next generation electronic developments	Analyze
CO 5:	Illustrate the basic devices in quantum electronics and circuit	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	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 5	3	2	-	-	-	-	-	-	-	-	-	-	-

SYLLABUS:

UNIT I: OPTICAL MATERIALS AND DEVICES 6 + 6

Classification of optical materials – Carrier generations and recombination process – Absorption, emission and scattering of light in solids – Photodiode – Solar cell – OLED – Optical data storage techniques – Blu ray disc

UNIT II: WAVE PROPAGATION IN DIELECTRICS 6 + 6

Wave equations for dielectrics – Polarization, reflection and refraction at dielectric interfaces – Light propagation in uniaxial crystals – NLO materials: properties and applications – Second harmonic generation of light (qualitative) – Optical waveguide, Types of optical waveguides

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UNIT III: MAGNETIC MATERIALS
6 + 6

Origin of magnetic materials – Classification of magnetic materials – Ferromagnetic theory – Hysteresis – Soft and hard magnetic materials – Magnetic memory devices – Magnetic tape – GMR Sensor – Magnetic bubble memories – Magstripe

UNIT IV: QUANTUM COMPUTING
6 + 6

Introduction to Quantum Computing – Moore's law and its limitations – Differences between Classical and Quantum computing – Concept of qubit and its properties – Representation of qubit by Bloch sphere – Single and Two qubits

UNIT V: QUANTUM CIRCUITS
6 + 6

Quantum devices – Qubit Gates, Single Qubit Gates: Quantum NOT Gate – Pauli – X, Y and Z Gates – Hadamard Gate – Phase Gate (or S Gate), T Gate – Multiple Qubit Gates (qualitative) – Quantum Chips

LIST OF PROJECTS

1. Working Model: Photodiode-Based Light Sensor
2. Demonstration: Solar Cell Output Under Various Light Conditions
3. Research Poster: NLO Materials & Second Harmonic Generation
4. Poster/Model: OLED vs LED Technology
5. Mini Project: Types of Optical Waveguides
6. Simulation: Light Propagation and Refraction in Dielectric Materials
7. Demo: Optical Fiber Communication Model
8. Experimental Setup: B-H Curve and Magnetic Hysteresis
9. Research Poster: GMR Sensor and its Use in Hard Drives
10. Demo/Report: Magnetic Tape vs Magstripe vs Bubble Memory
11. Conceptual Model: Ferromagnetic Domains
12. Presentation: Moore's Law and the Rise of Quantum Computing
13. Model: Bloch Sphere Representation

LEARN BEYOND CONTENT:

- Metamaterials for optics – Spintronics application – Quantum Cryptography Basics

CONTACT PERIODS:

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

TEXTBOOKS:

1. S O Pillai, "Solid State Physics", New Age International Private Limited, 8th Edition, 2018
2. Vishal Sahani, "Quantum Computing", McGraw Hill Education, 2007 Edition

REFERENCES:

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. Quantum Computing – A Beginner's Introduction, Parag K Lala, Indian Edition, McGrawHill, Reprint 2020
3. https://onlinecourses.nptel.ac.in/noc21_cs103/preview

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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 TiO_2

9. Synthesis of biodesel 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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- 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:

CO 1: Understand basic Python syntax, data types, and debugging using script and interactive modes   **Understand**

CO 2: Develop programs using conditionals, loops, functions, recursion, and apply appropriate variable scopes   **Apply**

CO 3: Implement object-oriented concepts and manipulate Python collections using slicing, aliasing, and comprehension   **Apply**

CO 4: Perform file operations, handle exceptions, and manage modules, packages, and dependencies in Python   **Apply**

CO 5: Apply NumPy, Pandas, and visualization tools to perform data analysis and generate real-world insights   **Apply**

CO - PO MAPPING:

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

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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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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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

U25ECG01	Basics of Electronics Engineering (Common to AD, AM, BM, CB, CE, CS, IT, SC)	Category: ESC				
		L	T	P	J	C
		1	0	2	0	2

PRE-REQUISITES:

- - Nil -

COURSE OBJECTIVES:

- To study about the basic electronics components and their applications
- To explore operational amplifiers for different applications
- To introduce the microcontrollers and Arduino programming

COURSE OUTCOMES:

CO 1:	Explain the principle of electronic components and applications	Understand
CO 2:	Summarize the operation and characteristics of op-amplifiers	Understand
CO 3:	Outline the applications of 8051 microcontroller and Arduino controller	Understand
CO 4:	Plot the various characteristics of diode, transistor and design the simple power supply	Apply
CO 5:	Identify the real application of op-amps and develop program using microcontrollers	Apply

CO - PO MAPPING:

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

SYLLABUS:

UNIT I: BASIC ELECTRONIC COMPONENTS AND APPLICATIONS   5 + 10

Passive and active components – PN junction diode and Zener diode – Bipolar Junction Transistor – Metal Oxide Semiconductor Field Effect Transistor – Applications of PN diode – SMPS

UNIT II: OPERATIONAL AMPLIFIER   5 + 10

Operational amplifier – Ideal characteristics – Inverting and non-inverting amplifier – Applications of op-amp – Adder, subtractor, integrator, differentiator, comparator

UNIT III: INTRODUCTION TO MICROCONTROLLER   5 + 10

8051 microcontroller – Architecture, instruction set, simple programs – Arduino controller

LIST OF EXPERIMENTS

1. Plot V-I characteristics of PN diode and Zener diode

2. Plot input and output characteristics of BJT

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3. Construct a half wave and full wave rectifier using PN diode

4. Design the power supply circuits using passive and active components

5. Verify the operation of adders and subtractor circuit using op-amps

6. Simple application program using 8051 microcontroller

LEARN BEYOND CONTENT:

- Voltage Regulator
- Instrumentation Amplifier
- I/O Port Interfacing

CONTACT PERIODS:

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

TEXTBOOKS:

1. S. Salivahanan, N. Sureshkumar, A. Vallavaraj, "Electronic Devices and Circuits", 3rd edition, Tata McGraw Hill, 2010

2. Donald A Neaman, "Semiconductor Physics and Devices", 4th edition, Tata McGraw Hill. 2012

REFERENCES:

1. R. S. Sedha, "A Textbook of Applied Electronics", 3rd edition, S.Chand & Company Ltd, 2013

2. Robert L Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory",11th edition Pearson India Education Services (P) Ltd., 2015

3. Roy Chaudary, "Linear Integrated Circuits", 6th edition, New Age International Publishers, 2021

4. Soumitra Kumar mandal, "Microprocessors and Microcontrollers Architecture Programming and Interfacing using 8085, 8086 & 8051", 1st edition, Tata McGraw Hill, 2011

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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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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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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

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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			Category: ESC				
U25AM201	Foundations of Artificial Intelligence		L	T	P	J	C
			3	0	0	0	3

PRE-REQUISITES:

- - Nil -

COURSE OBJECTIVES:

- To study and design Intelligent Agents for various AI applications
- To understand the concepts of Problem Solving, Uncertain knowledge and reasoning, communicating, perceiving, and acting problems
- To understand about AI, its applications and use cases

COURSE OUTCOMES:

CO 1:	Understand the basics of AI	Understand
CO 2:	Apply the AI Problem areas and analyse it in a structured manner	Apply
CO 3:	Apply AI algorithms and prove their performance mathematically	Apply
CO 4:	Design and visualize a real-world AI application with a data science tool	Apply
CO 5:	Apply various AI Applications and its uses	Apply

CO - PO MAPPING:

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

SYLLABUS:

UNIT I: FOUNDATIONAL CONCEPTS OF AI 9

What is AI – How AI works – Uses of AI – Types of AI – What is Intelligence – Decision Making– How do you make decisions – Introduction to AI and related terminologies: Define AI – Machine Learning – Deep Learning – Differentiate Image processing and computer Vision

UNIT II: AI PROJECT CYCLE 9

Introduction to AI Project Cycle – Understanding Problem Scoping – Data Acquisition – Visualizing Data – Data Exploration: Visualizing Data (data sets)

UNIT III: BASICS OF DATA SCIENCE 9

Introduction to Data Science – Applications of Data Science – Revisiting AI Project Cycle – Concepts of Data Sciences – Basics of Statistical Learning & Data Visualization (Bar chart, Pie chart, Scatter plots, box plots)

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UNIT IV: INTRODUCTION TO MODELLING 9

Introduction to Modeling – Introduction to Rule – Based & Learning Based AI Approaches – Introduction to Supervised, Unsupervised & Reinforcement Learning Models – Neural Networks – Evaluating the Model: Understanding Accuracy, Precision, Recall & F1 Score, confusion matrix

UNIT V: REAL LIFE AI IMPLEMENTATIONS 9

Artificial Intelligence Applications – AI in Marketing – Chatbots in Banking – Object Detection in Agriculture – Health care – Games – Case Study Space Exploration – Autonomous Vehicles

LEARN BEYOND CONTENT:

- Ethics in Artificial Intelligence, Natural Language Processing

CONTACT PERIODS:

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

TEXTBOOKS:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 4th edition, Prentice Hall, 2020
2. K.R.Chowdhary , "Fundamentals of Artificial Intelligence", 1st edition, Springer, 2020

REFERENCES:

1. Prateek Joshi, "Artificial Intelligence with Python",1st edition, Packt Publishing, 2017
2. Deepak Khemani, "A First Course in Artificial Intelligence", 2nd edition, McGraw Hill Education (India), 2017
3. Nick Bostrom, "Super intelligence: Paths, Dangers, Strategies", 1st edition, Oxford University Press, 2015
4. David Poole, Alan Mackworth, "Artificial Intelligence: Foundations of Computational Agents", 2nd edition, 2017
5. Elaine Rich and Kevin Knight. "Artificial Intelligence", 3rd edition, Tata McGraw Hill, 2019

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SEMESTER II

U25AM202	Linux and Shell Scripting Laboratory	Category: ESC				
		L	T	P	J	C
		0	0	4	0	2

PRE-REQUISITES:

- - Nil -

COURSE OBJECTIVES:

- To introduce Linux operating system and command-line interface
- To familiarize students with basic file handling and shell commands
- To enable students to write and execute shell scripts for automation
- To build confidence in navigating and managing Linux systems

COURSE OUTCOMES:

CO 1:	Understand and execute basic Linux commands	Understand
CO 2:	Manage files, directories, and permissions in Linux	Apply
CO 3:	Write and debug shell scripts to automate system tasks	Apply

CO - PO MAPPING:

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

SYLLABUS:

LIST OF EXPERIMENTS

1. Basic Linux Commands & File Management Introduction to Linux Environment - Login process, terminal, file system structure, basic commands: ls, pwd, cd, clear, whoami, date, cal

2. File and Directory Handling Commands: mkdir, rmdir, touch, cat, cp, mv, rm, head, tail, more, less

3. File Permissions and Ownership : Use of chmod, chown, umask, symbolic and numeric modes of permissions

4. Working with Linux Utilities File Searching and Filtering Use of find, locate, grep, sort, uniq, cut, wc, diff, cmp

5. Process Management and System Monitoring Commands: ps, top, kill, nice, df, du, uptime, free, uname, who

6. Archiving and Compression Utilities: Using tar, gzip, gunzip, zip, unzip, xz.

7. Shell Scripting Basics Writing Simple Shell Scripts : Hello world, script execution, comments, variables, read, echo, expr, let

8. Conditional Statements in Shell Use of if, if-else, if-elif-else, test conditions, integer/string/file comparisons

9. Looping Constructs in Shell : for, while, until loops; loop control commands: break, continue

10. Advanced Shell Scripting: User-defined Functions in Shell Scripts: Declaring, calling functions, passing arguments, scope of variables

11. Command Line Arguments and Script Automation : Use of $1, $2, $@, $#, automating tasks like backup, log monitoring

LEARN BEYOND CONTENT:

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- Mini Project: Linux-based Automation Build a practical mini project combining multiple shell concepts

CONTACT PERIODS:

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

TEXTBOOKS:

1. Richard Blum and Christine Bresnahan. "Linux Command Line and Shell Scripting Bible", 4th Edition, Wiley, 2020

2. Yashavant P. Kanetkar. "Unix Shell Programming", Revised Edition, BPB Publications, 2016

REFERENCES:

1. B.M. Harwani. "Unix and Shell Programming", 1st Edition, Oxford University Press, 2013

2. Michael Kerrisk. "The Linux Programming Interface", 1st Edition, No Starch Press, 2010

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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

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

		Category: HSMC				
U25LEG06	**Nihongo no Enginia – Japanese II** (Common to all programmes)	**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 **Remember** vocabulary and phrases

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 **Apply** with improved accuracy

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

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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

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2. Takahashi, A., & Sato, M., "Nihongo Pro: Japanese for N5 Level," 1st Edition, KADOKAWA, 2018

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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

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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 – Guestion structures – Postpositions – Honorifics – Cultural note: Integrating cultural etiquette with language use – Real-world scenarios for communication in Hindi

LIST OF EXPERIMENTS

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

CONTACT PERIODS:

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

TEXTBOOKS:

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

REFERENCES:

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

U25MCC06	Universal Human Values II (Common to all programmes)	Category: MCC				
		L	T	P	J	C
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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 **Understand** profession

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

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

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

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

CO - PO MAPPING:

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

SYLLABUS:

UNIT I: INTRODUCTION-BASIC HUMAN ASPIRATION, ITS FULFILLMENT THROUGH ALL ENCOMPASSING 6 + 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 beats – Archeological evidences – Gem stone types described in Silappathikaram

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UNIT IV: AGRICULTURE AND IRRIGATION TECHNOLOGY

3

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

UNIT V: SCIENTIFIC TAMIL & TAMIL COMPUTING

3

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

CONTACT PERIODS:

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

TEXTBOOKS:

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

REFERENCES:

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

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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 EMPHATHIZE STAGE   3 + 6

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

UNIT III: THE DEFINE STAGE   3 + 6

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

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UNIT IV: THE DIVERGENCE AND CONVERGENCE STAGE
3 + 6

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

UNIT V: THE COMMUNICATION STAGE
3 + 6

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

LIST OF EXPERIMENTS

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

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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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 **Understand** and file management in computing

CO 2: Apply basic computational concepts such as data types, variables, operators, algorithms, and logic gates **Apply** to solve simple problems

CO 3: Develop simple programs using input/output operations, control structures, arrays, and strings in the C **Apply** language

CO - PO MAPPING:

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

1. 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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U25MCC05	Biology for Engineers (Common to all programmes)	Category: MCC				
		L	T	P	J	C
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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
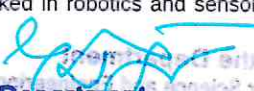
UNIT II: HUMAN PHYSIOLOGY 5

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)

UNIT V: BASIC LABORATORY TESTS

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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