PSGR Krishnammal College for Women

BACHELOR OF SCIENCE IN COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)

PROGRAMME CODE: AI

CHOICE BASED CREDIT SYSTEM (CBCS) &

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK (LOCF)

SCHEME OF EXAMINATION & SYLLABUS

(w.e.f 2026-2027 onwards)

REGULATIONS 2026

Verified for CoE submission

UNDERGRADUATE PROGRAMMES

(a) Qualification Descriptors

Aligned with NHEQF Level 6 (Bachelor's Degree Level).

A Bachelor's Degree signifies that a learner has completed a structured programme of study that develops disciplinary knowledge, professional competence, transferable skills and ethical values.

Graduates are expected to demonstrate:

- A systematic understanding of the discipline and its linkages with related fields
- Procedural and professional knowledge relevant to employment, higher education and public service
- Ability to identify problems, collect and analyze data, and develop evidence-based solutions
- Effective communication of academic and professional work
- Capacity for self-directed learning and adaptation to new contexts
- Ability to apply disciplinary knowledge and transferable skills in real-world contexts
- Development of employability skills relevant to professional careers

(b) Graduate Attributes (GAs)

GA Code	Graduate Attributes
GA1	Disciplinary Knowledge
GA2	Communication Skills
GA3	Critical Thinking
GA4	Problem Solving
GA5	Analytical Reasoning
GA6	Research-related Skills
GA7	Cooperation/Teamwork
GA8	Scientific Reasoning
GA9	Reflective Thinking
GA10	Information/Digital Literacy
GA11	Self-Directed Learning
GA12	Multicultural Competence
GA13	Moral and Ethical Awareness/Reasoning
GA14	Leadership Readiness
GA15	Lifelong Learning

(c) GAs – Written Measured

These GAs are directly measurable through written examinations, assignments, or structured theory evaluation.

GA	Attribute	Measure	Assessment Method
GA1	Disciplinary Knowledge	Strongly	Theory examinations, concept-based questions, structured problem solving
GA3	Critical Thinking	Strongly	Case analysis, reasoning questions
GA4	Problem Solving	Strongly	Application-oriented problems, scenario-based questions
GA5	Analytical Reasoning	Strongly	Data interpretation, logical analysis, numerical exercises
GA6	Research-related Skills	Partially	Research oriented questions, data interpretation, literature review writing
GA8	Scientific Reasoning	Partially	Evidence-based explanations, logical justification questions
GA9	Reflective Thinking	Limited	Short reflective writing responses
GA10	Information/Digital Literacy	Limited	Application of digital tools and information ethics

(d) GAs – Performance based

These require observation of behaviour, participation, skill demonstration, or real-time engagement.

GA	Attribute	Measure	Assessment Method
GA2	Communication Skills	Strongly	Presentations, seminars, viva voce, group discussions
GA7	Cooperation/Teamwork	Strongly	Group projects, peer evaluation, collaborative assignments
GA11	Self-Directed Learning	Limited	Independent assignment / Project work / Online learning task
GA12	Multicultural Competence	Partially	Group activities with diverse teams / Fieldwork / Community engagement, Participation in cultural activities,
GA13	Moral and Ethical Awareness/Reasoning	Partially	Behavioural observation methods, Reflective reports
GA14	Leadership Readiness	Limited	Team leadership in project, Event coordination
GA15	Lifelong Learning	Limited	Participation in value added courses, certification

Department of Computer Science (Artificial Intelligence)

Vision

To empower graduates with knowledge and skills in Artificial Intelligence and intelligent computing, enabling them to become innovative AI professionals who develop intelligent solutions for real-world challenges in the global technological society.

Mission

- To promote a comprehensive understanding of Artificial Intelligence, Machine Learning, and data-driven technologies, enabling students to develop responsible and innovative technological solutions for real-world and societal challenges.

- To prepare competent graduates with strong skills in programming, data analytics, algorithms, and intelligent system development, aligned with the demands of modern computing and emerging career opportunities.

- To encourage research, innovation, and interdisciplinary collaboration in emerging domains such as Artificial Intelligence, Machine Learning, Data Science, Robotics, and Intelligent Systems.

- To cultivate ethical values, responsible AI practices, and social awareness, empowering students to contribute effectively to technological advancement and sustainable societal development.

- To promote lifelong learning and professional growth through contemporary teaching–learning methodologies, experiential learning opportunities, industry interaction, and community engagement.

Bachelor of Science in Computer Science (Artificial Intelligence)

Programme Objectives, Outcomes and Mapping

Programme Educational Objectives (PEOs)

(Expected career and professional achievements of graduates within three to five years of completing the programme)

PEO 1 – Graduates will demonstrate strong foundational knowledge in Artificial Intelligence, Machine Learning, and intelligent computing to understand and solve complex technological problems.

PEO 2 – Graduates will apply programming, algorithms, and data structures to design and develop efficient AI-based applications and intelligent systems.

PEO 3 – Graduates will utilize data analytics, machine learning techniques, and computational tools to analyze real-world data and develop intelligent solutions.

PEO 4 – Graduates will engage in research, innovation, and interdisciplinary collaboration in emerging domains such as AI, Data Science, Robotics, and intelligent systems.

PEO 5 – Graduates will acquire the technical competencies and professional skills required to succeed in careers related to Artificial Intelligence, software development, data science, and emerging computing technologies.

PEO 6 – Graduates will demonstrate ethical values and responsible use of Artificial Intelligence while addressing societal and technological challenges.

PEO 7 – Graduates will apply AI technologies to develop solutions that contribute to social welfare, sustainable development, and community advancement.

PEO 8 – Graduates will pursue continuous learning, higher education, and professional growth to adapt to rapidly evolving technological environments.

Programme Learning Outcomes (PLOs)

(Specific abilities, knowledge, and skills that graduates are expected to demonstrate upon Graduation)

PLO 1 – Apply foundational knowledge of computer science, mathematics, and Artificial Intelligence to understand and solve computational problems.

PLO 2 – Develop efficient programs using appropriate programming languages, data structures, and algorithms to build intelligent applications.

PLO 3 – Analyze complex computing problems and identify suitable AI techniques and computational approaches to solve them.

PLO 4 – Apply Artificial Intelligence and Machine Learning techniques to design and implement intelligent systems for real-world applications.

PLO 5 – Utilize data analytics and statistical techniques to extract meaningful insights and support data-driven decision making.

PLO 6 – Design, develop, and evaluate intelligent software systems using appropriate tools, technologies, and development methodologies.

PLO 7 – Demonstrate research orientation and innovation in emerging areas such as Artificial Intelligence, Data Science, Robotics, and intelligent systems.

PLO 8 – Apply ethical principles and responsible AI practices while developing and deploying intelligent technologies.

PLO 9 – Work effectively as an individual and as a member of multidisciplinary teams in the development of AI-based solutions.

PLO 10 – Recognize the need for continuous learning and adapt to emerging technologies, professional practices, and evolving industry requirements.

PLOs with Bloom's Levels, Assessment Methods, and Graduate Attribute Mapping

PLO No	Programme Learning Outcome	Bloom's Level	Assessment Methods	Mapped GAs
PLO1	Apply fundamental knowledge of computer science, mathematics, and Artificial Intelligence to solve computational problems.	K3	CIA, ESE, Practical	GA1, GA3
PLO2	Develop efficient programs using appropriate programming languages, data structures, and algorithms.	K3	Lab Exercises, assignments	GA2, GA6
PLO3	Analyze complex computing problems and identify suitable AI techniques for effective solutions.	K4	Case studies, Problem solving assignments	GA3, GA4
PLO4	Apply Artificial Intelligence and Machine Learning techniques to design intelligent systems for real-world applications.	K6	Internship, Project Viva	GA4, GA5, GA6
PLO5	Utilize data analytics and statistical techniques to extract insights from structured and unstructured data.	K4	Lab Exercises	GA5, GA6
PLO6	Design and develop intelligent software systems using appropriate development methodologies and tools.	K3	Practical Exam, Mini Projects	GA2, GA6
PLO7	Demonstrate research aptitude and innovation in emerging domains such as AI, Data Science, and Robotics.	K5	Case Study, Assignment, Projects, Internships	GA7, GA5
PLO8	Apply ethical principles and responsible AI practices while developing computing solutions.	K3	Seminars, Project, Field Work, Case Study	GA8, GA11
PLO9	Work effectively as an individual and as a member of multidisciplinary teams to develop computing solutions.	K3	Seminar, Internship, Project	GA9, GA13
PLO10	Recognize the need for continuous learning and adapt to emerging technologies, professional practices, and evolving industry requirements.	K4	Assignments, Seminars, Quiz, Puzzles	GA10, GA9. GA14

Programme Specific Outcomes (PSOs)

(Expected knowledge, skills, and competencies that graduates will acquire by the end of the programme)

PSO1 – Design, develop, and implement intelligent software applications using programming languages, AI frameworks, and modern software development practices through laboratory work, projects, and internships.

PSO2 – Build and evaluate machine learning and data analytics models to solve real-world problems using structured and unstructured data through practical experiments and project-based learning.

PSO3 – Design and implement AI-driven systems such as recommendation systems, chatbots, and predictive applications through mini projects, capstone projects, and industry-oriented problem solving.

PSO4 – Utilize modern AI tools, cloud platforms, and development environments to develop, test, and deploy scalable AI solutions through hands-on projects and practical training.

PSO5 – Develop computer vision, natural language processing, and multimodal AI applications through project work involving image, text, and speech data.

PSO6 – Evaluate and implement AI solutions considering ethical, societal, privacy, and professional responsibilities, demonstrated through case studies, projects, and research-based activities.

PSO Alignment with Core Courses and Skill Competencies

PSO No	Programme Specific Outcome	Supporting Core Courses	Skill Competency
PSO1	Design, develop, and implement intelligent software applications using programming languages and AI frameworks through laboratory work and projects.	Programming in Python, Data Structures, Artificial Intelligence Fundamentals, Software Engineering	Programming proficiency, algorithm design, software development, debugging
PSO2	Build and evaluate machine learning and data analytics models to solve real-world problems through project-based learning.	Machine Learning, Data Mining, Statistics for AI, Data Analytics	Data preprocessing, predictive modeling, statistical analysis, data visualization
PSO3	Design and implement AI-driven systems such as chatbots, recommendation systems, and predictive applications through mini projects.	Modern Artificial Intelligence, Deep Learning, Machine Learning	System design, model training, problem solving, project development
PSO4	Utilize modern AI tools, frameworks, and cloud platforms to develop and deploy scalable AI solutions through practical training.	AI Tools & Frameworks, Cloud Computing, Big Data Analytics	Tool proficiency, cloud deployment, model optimization, scalability
PSO5	Develop computer vision and natural language processing applications using multimodal data through project work.	Computer Vision, Natural Language Processing, Pattern Recognition	Image processing, text processing, multimodal AI development
PSO6	Evaluate and implement AI solutions considering ethical, societal, and privacy implications through case studies and research activities.	AI Ethics, Cyber Security, Project Viva	Ethical reasoning, responsible AI practices, data privacy awareness

SCHEME OF EXAMINATION

Sem	Part	Course Code	Course Title	Course Type	Hours/ Week	Credits	Examination			
							Duration in Hours	Maximum Marks		
								CA	ESE	TOTAL
I	I	TAM2601A	Tamil Paper I	**AEC**	4	3	3	25	75	100
		HIN2601A	Hindi Paper I							
		FRE2601A	French Paper I							
	II	ENG2601A	English Paper I	**AEC**	4	3	3	25	75	100
	III	AI26C01	Core I: Java Programming	**DSC**	5	4	3	25	75	100
		AI26CP1	Core Practical I: Java Programming Lab	**DSC**	4	2	3	15[$$]	35[$$]	50
		AP26C02	Core II: Operating System	**DSC**	5	4	3	25	75	100
		TH26A04	Generic Elective I: Linear Algebra	**MDC**	6	5	3	25	75	100
	IV	NME26B1	Basic Tamil I	**AEC**	2	2	-	100*		100
		NME26A1	Advanced Tamil I							
		NME26ES	Introduction to Entrepreneurship	**VAC**						
I – II	VI	NM26GAW	General Awareness	**VAC**	SS	-	-	-	-	-
I – II		COM26SER	Community Services 30 Hours	**VAC**	-	-	-	-	-	-
I – V		26BONL1 26BONL2 26BONL3	Online Course I Online Course II Online Course III	**ACC**	-	-	-	-	-	-
Semester I				**Total**	**30**	**23**				**650**
	I	TAM2602A	Tamil Paper II							
		HIN2602A	Hindi Paper II							

II		FRE2602A	French Paper II	**AEC**	4	3	3	25	75	100
	II	ENG2602A	English Paper II	**AEC**	4	3	3	25	75	100
	III	AI26C03	Core III: Python Programming	**DSC**	4	4	3	25	75	100
		AI26C04	Core IV: Data Structures	**DSC**	4	3	3	25	75	100
		AI26CP2	Core Practical II: Python Programming Lab	**DSC**	3	2	3	15[$$]	35[$$]	50
		AI26CP3	Core Practical III: Statistical Tools for AI Lab	**DSC**	3	2	3	15[$$]	35[$$]	50
		TH26A13	Generic Elective II: Statistics for Computer Science	**MDC**	6	2	3	25	75	100
	IV	NME26B2	Basic Tamil II	**AEC**	2[€]	Gr.	-	100*	-	100[£]
		NME26A2	Advanced Tamil II							
		NM26UHR	Universal Human Values and Human Rights	**VAC**	2	2	-	100*	-	100
I – II	VI	NM26GAW	General Awareness	**VAC**	SS	Gr.	-	100*		100[£]
I – II		COM26SER	Community Services 30 Hours	**VAC**	-	St.	-	-	-	-
I – V		26BONL1 26BONL2 26BONL3	Online Course I Online Course II Online Course III	**ACC**	-	-	-	-	-	-
Semester II				**Total**	**30**	**21**				**700**
III	I	TAM2603A	Tamil Paper III	**AEC**	4	3	3	25	75	100
		HIN2603A	Hindi Paper III							
		FRE2603A	French Paper III							
	II	ENG2603A	English Paper III	**AEC**	4	3	3	25	75	100

III	III	AI26C05	Core V: Principles of Artificial Intelligence and Ethics	**DSC**	5	3	3	25	75	100
		AI26C06	Core VI: Computer Networks	**DSC**	5	3	3	25	75	100
		AI26CP4	Core Practical IV: Database Management System Lab	**DSC**	5	3	3	15$^{\$\$}$	35$^{\$\$}$	50
		TH26A21	Generic Elective III: Discrete Mathematics	**MDC**	4	3	3	25	75	100
	IV	NM26DRM	Disaster Risk Reduction and Management	**SEC**	3	3	-	100*	-	100
		NM26HAW	Health and Wellness	**VAC**	SS	1	-	100*	-	100
I – V	VI	26BONL1 26BONL2 26BONL3	Online Course I Online Course II Online Course III	**ACC**	-	-	-	-	-	-
Semester III				**Total**	**30**	**22**				**750**
IV	I	TAM2604	Tamil Paper IV	**AEC**	4	3	3	25	75	100
		HIN2604	Hindi Paper IV							
		FRE2604	French Paper IV							
	II	ENG2604	English Paper IV	**AEC**	4	3	3	25	75	100
	III	AI26C07	Core VII: Machine Learning	**DSC**	4	4	3	25	75	100
		AI26C08	Core VIII: Data Mining	**DSC**	3	3	3	25	75	100
		AI26CP5	Core Practical V: Machine Learning Lab	**DSC**	3	2	3	15$^{\$\$}$	35$^{\$\$}$	50
		AI26CP6	Core Practical VI: Data Mining	**DSC**	3	2	3	15$^{\$\$}$	35$^{\$\$}$	50

			Lab							
		AP26A01	Generic Elective IV: Digital Marketing **(OR)**	**MDC**	4	3	3	25	75	100
		CS26A02	Generic Elective IV: M-Commerce							
	IV	AI26SECE	Coursera: IBM Applied AI	**SEC**	3	3	-	100*	-	100
		NM26EII	Entrepreneurship and Innovation (IgniteX)	**VAC**	2	2	-	100*	-	100
		NM26EVS	Environmental Studies	**VAC**	SS	Gr.	-	100*	-	100[£]
	V	26COACT	Co-Curricular Activities	**VAC**	-	1	-	100*	-	100
I – V	VI	26BONL1 26BONL2 26BONL3	Online Course I Online Course II Online Course III	**ACC**	-	-	-	-	-	-
Semester IV				**Total**	**30**	**26**				**900**
V	III	AI26C09	Core IX: Deep Learning	**DSC**	4	4	3	25	75	100
		AI26C10	Core X: Big Data Framework	**DSC**	4	4	3	25	75	100
		AI26C11	Core XI: Software Engineering	**DSC**	4	4	3	25	75	100
		AI26CP7	Core Practical VII: Deep Learning Lab	**DSC**	5	3	3	15[$$]	35[$$]	50
		AI26CP8	Core Practical VIII: Big Data Framework Lab	**DSC**	3	2	3	15[$$]	35[$$]	50
		AI26E03	Generic Elective V: Natural Language Processing **(OR)**	**DSE**	5	4	3	25	75	100

		AI26E04	Generic Elective V: Image Processing							
		AI26SEP1	Data Visualization Tools	**SEC**	3	3	-	100*	-	100
		AI26AC1	Advance Learner Course I: Fundamentals of Quantum Computing **(OR)**	**ACC**	SS	5^	3	25	75	100^
		AI26AC2	Advance Learner Course I: Business Intelligence							
	IV	NM26CS1	Cyber Security I	**VAC**	2	Gr.	-	100*	-	100£
		CE26INST	Field work/ Institutional Training (21 Days)	**VAC**	-	2	-	100*	-	100
	VI	CE26COM	Comprehensive Examination	**DSC**	-	Gr.	-	100*	-	100£
I – V	VI	26BONL1 26BONL2 26BONL3	Online Course I Online Course II Online Course III	**ACC**	-	Cr. ^ /St.	-	-	-	-
Semester V				**Total**	**30**	**26**				**700**
VI	III	AI26C12	Core XII: Modern Artificial Intelligence	**DSC**	5	4	3	25	75	100
		AI26E05	Elective 1: Cloud Computing **(OR)**	**DSC**	5	4	3	25	75	100
		AI26E06	Elective 2: Fundamentals of Robotics							
		AI26CP9	Core Practical IX: Artificial Intelligence Lab	**DSC**	5	3	3	15$$	35$$	50

		AI26CP10	Full Stack Development Lab	**DSC**	5	3	6	15[$$]	35[$$]	50
		AI26PROJ	Project and Viva-Voce	**DSE**	7	5	3	25	75	100
	IV	AI26SEP2	Data Analytics Tools	**SEC**	3	3	-	100*	-	100
	III	AI26AC3	Advance Learner Course II: AI for Analytics **(OR)**	**ACC**	SS	5^	3	25	75	100^
		AI26AC4	Advance Learner Course II: Fundamentals of Prompt Engineering							
Semester VI				**Total**	**30**	**22**				**500**
I - VI	**Total**					**140 + Additional Credits**				**4200 + Marks for Additional Credit Courses**

Hours of Instructions is inclusive of lectures, seminars, presentations, case-studies, etc

List of Generic Elective Courses offered to other Programmes

(can choose any one of the courses as Generic Elective)

Semester	Course Type	Course Code	Course Title	Programmes
I	MDC – Generic Elective I	TH26A04	Linear Algebra	B.Sc Mathematics
II	MDC – Generic Elective Practical I	TH26A13	Statistics for Computer Science	B.Sc Mathematics
III	MDC – Generic Elective III	TH26A21	Discrete Mathematics	B.Sc Mathematics
IV	MDC – Generic Elective IV	AP26A01	Generic Elective IV: Digital Marketing (OR)	B. C. A
		CS26A02	Generic Elective IV: M-Commerce	B.Sc Computer Science
V	MDC – Generic Elective V	AI26E01	Generic Elective V: Natural Language Processing	B. Sc Computer Science (Artificial Intelligence)
		AI26E02	Generic Elective V: Image Processing	B.Sc Computer Science (Artificial Intelligence)
VI	MDC – Generic Elective VI	AI26E03	Elective 1: Cloud Computing	B. Sc Computer Science (Artificial Intelligence)
		AI26E04	Elective 2: Fundamentals of Robotics	B. Sc Computer Science (Artificial Intelligence)

Symbols and Notations

Symbols	Notations
*	Course assessed through Internal Assessment (CIA) only
Gr.	Grade awarded based on CBCS grading system
St.	Course Status (Completed/Not Completed)
^	Advanced Learner Course, Online Courses – Additional Credit Courses
@	Course assessed through End Semester Examination (ESE) only
#	Open Book Examination
$	Evaluation Pattern converted from 25:75:100 to 20:55:75 (CIA:ESE:Total) structure
$$	Evaluation Pattern converted from 25:75:100 to 15:35:50 (CIA:ESE:Total) structure
€	Hours per Week Outside Class Hours
£	Marks not considered for total; grade will be awarded

Abbreviation	Course Type
DSC	Discipline Specific Core Courses
DSE	Discipline Specific Elective Courses
MDC	Multidisciplinary Courses
AEC	Ability Enhancement Course
SEC	Skill Enhancement Course
VAC	Value Added Courses
ACC	Additional Credits Courses

Assessment and Evaluation Framework
Continuous Internal Assessment (CIA) – 25%

Component	Activities Included
Internal Tests	Periodic written tests
Assignments / Case Studies	● Written assignments ● Case analysis reports ● Article reviews ● Literature review tasks ● Data interpretation exercises ● Policy analysis (Arts & Humanities) ● Business case studies (Commerce & Management) ● Lab-based analytical reports (Science)
Seminars / Presentations	● PowerPoint presentations ● Poster presentations ● Panel discussions ● Group seminars ● Viva voce ● Digital presentations using multimedia tools ● Peer evaluation rubrics
ICT-based Tasks	● Spreadsheet analysis ● Accounting software / statistical software ● Online quizzes ● Simulation tools ● E-content creation ● Coding platforms (for relevant disciplines)
Projects / Field Reports	● Field surveys ● Industry visits ● Internship reports ● Mini-projects ● Laboratory experiments ● Community-based research ● Data collection & statistical analysis ● Reflective journals

End Semester Examination (ESE) – 75%

Component	Description
Written Examination	3-hour written examination covering all CLOs
Cognitive Levels	Questions aligned with multiple Bloom's Taxonomy (K-levels)

Professional Conduct	Ethical and professional conduct during examination
Academic Compliance	Timely submission and participation as per regulations

Assessment Components Aligned with Blooms Levels

EXAMINATION SYSTEM

Semester system will be followed. A semester consists of a minimum of 90 working days excluding the days of conduct of ESE. There will be Continuous Internal Assessment (CA) to evaluate the performance of students in each course and the End Semester Examination will be held at the end of every semester. Marks for ESE and CA with reference to the maximum marks for the courses will be as follows:

Max. Marks	CA	ESE
100	25	75
75	20	55
50	15	35

A. Bloom's levels are followed in question papers and aligned with CLOs and CA components.

Remember - K1
Understand - K2
Apply - K3
Analyze - K4
Evaluate - K5
Create - K6

B. Continuous Internal Assessment CA

The weightage assigned to various components of the CA is as follows

<u>Undergraduate Programmes</u>

a. Theory

AEC (Language, English), DSC (Core, Elective) & MDC (GE-Allied)

CA Components	Marks	K level
CIA Test	5 Marks (Conducted for 45 marks after 50 days – 3 units)	K1 to K6 as per QP Pattern
Model Exam	7 Marks (Conducted for 75 marks after 85 days - Each Unit 15 Marks)	
Seminar	4 Marks	K6
Assignment	4 Marks	K5
ICT (Quiz)	2 Marks	K2
Attendance	3 Marks (Attendance 75% - 80% - 1 Mark, 81% - 90% - 2 Marks, 91% - 100% - 3 Marks)	
Total	**25 Marks**	

For Science allied courses with theory as 75 marks, the split-up is 20 marks as internal and 55 as external. Internal conducted for 25 and converted to 20 marks and external conducted for 75 and converted to 55 marks.

b. Practical

CA Components	Marks	K level
Lab Performance	7 Marks	K4
Internal Viva Voce	5 Marks	K4
Model Exam	10 Marks	K5
Attendance	3 Marks	
Total	**25 Marks**	

For practical courses with 50 marks as ESE, the split-up is 15 marks as internal and 35 as external. Internal conducted for 25 and converted to 15 marks and external conducted for 75 and converted to 35 marks.

c. Skill Enhancement Courses

Theory courses

CA Components	Marks	K level
Test I	30 Marks (Conducted for 45 marks and converted to 30 Marks – 3 Units)	K2 to K6 as per QP Pattern
Test II	50 Marks (Conducted for 75 marks after 85 days - Each Unit 15 Marks)	
Assignment	10 Marks	K5
Seminar	10 Marks	K6
Total	**100 Marks**	

Practical Courses

CA Components	Marks	K level
Practical exam	80 Marks (Practical Execution: 65 Marks, Record: 15 Marks)	K5
Lab Performance	10 Marks	K4
Internal Viva Voce	10 Marks	K4
Total	**100 Marks**	

Theory and Practical

CA Components	Marks	K level
Test I (Theory)	30 Marks (Conducted for 45 Marks and converted to 30 Marks)	K2 – K6

Test II (Practical)	50 Marks (Practical Execution: 40 Marks, Record: 10 Marks)	K5
Lab Performance	10 Marks	K4
Internal Viva Voce	10 Marks	K4
Total	**100 Marks**	

Theory and Project

CA Components	Marks	K level
Test I (Theory)	30 Marks (Conducted for 45 Marks and converted to 30 Marks)	K2 – K6
Project Examination	30 Marks	K5
Internal Viva Voce	40 Marks	K4
Total	**100 Marks**	

d. Project: Individual / Group Project

Components	Marks	K level
Continuous Internal Assessment (CA**)**	25 Marks	K3, K4, K6
End Semester Examination	75 Marks	K5, K6
Total	**100 Marks**	

Continuous Internal Assessment (CA)

CA Components	Marks	K level
I Review - Project Proposal Presentation	5 Marks	K3
II Review - Periodic Review-Progress Evaluation	10 Marks	K4
III Review - Project Report Draft Submission	10 Marks	K6
Total	**25 Marks**	

End semester examination

Components	Marks	K level
Evaluation of the Project Report	25 Marks	K6
Viva Voce	50 Marks	K5
Total	**75 Marks**	

e. Introduction to Entrepreneurship / Women Studies / Universal Human Values and Human Rights / Environmental Studies / Cyber Security I

CA Components	Marks	K level
ICT (Quiz)	50 Marks	K2
Assignment	25 Marks	K5
Project / Case study / Poster	25 Marks	K6
Total	**100 Marks**	

f. Entrepreneurship and Innovation (IgniteX)

CA Components	Marks	K level

ICT (Quiz)	50 Marks (3 Quizzes each quiz 25 marks, 75 marks converted to 50 marks)	K2
ICT (Pitch Deck Presentation)	20Marks	K6
Assignment	30 marks (30 Venture Activities)	K5
Total	**100 Marks**	

g. Advanced Tamil & Basic Tamil

Components	Marks	K level
CIA	25 Marks (conducted for 45 marks after 50 days)	K1 to K6 as per QP Pattern
Model	50 marks (conducted for 75 marks after 85 days)	
ICT (Quiz)	15Marks	K2
Assignment	10 Marks	K5
Total	**100 Marks**	

h. General Awareness / Comprehensive Examination / Co-Curricular Activities / Community Services

Course Title	Marks	K level
General Awareness	100	K3
Comprehensive Examination	100	K3
Co-Curricular Activities	100	K6
Community Services	*St.*	K6

i. ***Field Work / Institutional Training*****:**

CA Components	Marks	K level
Work diary	15 Marks	K3
Report	50 Marks	K6
Viva Voce	25 Marks	K5
Attendance	10 Marks	
Total	**100 Marks**	

j. Advance learner Course:

CA Components	Marks	K level
Test 1	10 Marks (conducted for 45 marks after 50 days – 3 units)	K1 to K6 as per QP Pattern
Model Exam	15 Marks (Conducted for 75 marks after 85 days (Each Unit 15 Marks)	
Total	**25 Marks**	

Postgraduate Programme

a. Core and Elective (Including Course with Open Book Examination)

CA Components	Marks	K Level
CIA Test	5 Marks (conducted for 45 marks after 50 days – 3 units)	K2 to K6 as per QP Pattern
Model Exam	7 Marks (Conducted for 75 marks after 85 days) (Each Unit 15 Marks)	
Seminar	4 Marks	K6
Assignment	4 Marks	K5
ICT (Quiz)	2 Marks	K2
Attendance	3 Marks (Attendance 75% - 80% - 1 Mark, 81% - 90 % - 2 Marks, 91% - 100% - 3 Marks)	
Total	**25 Marks**	

b. Coursera in combination with Core Course:

CA Components	Marks	K Level
Coursera	25 Marks (100 marks from Coursera converted to 25 marks)	K4
CIA Test	25 Marks (conducted for 45 marks from Coursera converted to 25 marks)	K2 to K6 as per QP Pattern
Model Exam	30 Marks (conducted for 75 marks from Coursera converted to 30 marks)	
Assignment	10 Marks	K5
Seminar	10 Marks	K6
Total	**100 Marks**	

c. Practical

CA Components	Marks	K Level
Lab Performance	7 Marks	K4
Internal Viva-Voce	5 Marks	K4
Model Exam	10 Marks	K5
Attendance	3 Marks	
Total	**25 Marks**	

For practical courses with 50 marks as ESE, the split-up is 15 marks as internal and 35 as external. Internal conducted for 25 and converted to 15 marks and external conducted for 75

and converted to 35 marks.

d. Cyber Security II

CA Components	Marks	K Level
ICT (Quiz)	50 Marks	K2
Assignment	25 Marks	K5
Project / Case Study / Poster	25 Marks	K6
Total	**100 Marks**	

e. Advance Learner Course

CA Components	Marks	K Level
Test 1	10 Marks (conducted for 45 marks after 50 days – 3 units)	K2 to K6 as per QP Pattern
Model Exam	15 Marks (Conducted for 75 marks after 85 days (Each Unit 15 Marks)	
Total	**25 Marks**	

f. Comprehensive Examination

Course Title	Marks	K level
Comprehensive Examination	100	K3

g. Project and Viva voce

Components	Marks	K level
Continuous Internal Assessment (CA**)**	25 Marks	K3, K4, K6
End Semester Examination	75 Marks	K5, K6
Total	**100 Marks**	

Continuous Internal Assessment (CA)

CA Components	Marks	K Level
I Review - Project Proposal Presentation	5 Marks	K3
II Review - Periodic Review-Progress Evaluation	10 Marks	K4
III Review - Project Report Draft Submission	10 Marks	K6
Total	**25 Marks**	

End Semester Examination

Components	Marks	K level
Evaluation of the Project Report	25 Marks	K6
Viva Voce	50 Marks	K5

Total	**75 Marks**	

h. *Summer Internship* / Field Work / Institutional Training

CA Components	Marks	K Level
Work diary	15 Marks	K3
Report	50 Marks	K6
Viva Voce	25 Marks	K5
Attendance	10 Marks	
Total	**100 Marks**	

C. Schedule for CA Tests

One test for Continuous Assessment (3 Units) will be conducted on pre-determined date i.e., commencing on the 50th day from the date of reopening. The model exam (5 units) will be conducted after completing 85th working day.

D. Question Paper Pattern and Distribution of Marks for CA – UG

UG : Language, English, Core, Elective, Allied, ALC, Basic Tamil and Advanced Tamil - (First 3 Units)

Description	Marks	Number of questions in K level					
Questions from each unit comprising of		**K1**	**K2**	**K3**	**K4**	**K5**	**K6**
One question with a weightage of 2 Marks	3 X 2 = 6	**1**	**2**				
One question with a weightage of 5 Marks (Internal Choice at the same CLO level)	3 X 5 = 15			1	1	1	
One question with a weightage of 8 Marks (Internal Choice at the same CLO level)	3 X 8 = 24			1	1		1
Total	**45 Marks**						

Skill Enhancement Courses - UG

Description	Marks	Number of questions in K level					
Questions from each unit comprising of		**K1**	**K2**	**K3**	**K4**	**K5**	**K6**
One question with a weightage of 5 Marks (Internal Choice at the same CLO level)	3 x 5 = 15		1	1	1	1	1
One question with a weightage of 10 Marks (Internal Choice at the same CLO level)	3 x 10 = 30			2	1	1	1
Total	**45 Marks**						

E. Model /End Semester Examination – Question Paper Pattern and Distribution of Marks

UG : Language, English, Core, Elective, Allied, ALC, Basic Tamil & Advanced Tamil

Description	**Marks**	**Number of questions in K level**					
Questions from each unit comprising of		**K1**	**K2**	**K3**	**K4**	**K5**	**K6**
One question with a weightage of 2 Marks	5 x 2 = 10	2	3				
One question with a weightage of 5 Marks (Internal Choice at the same CLO level)	5 x 5 =25			2	2	1	
One question with a weightage of 8 Marks (Internal Choice at the same CLO level)	5 x 8 =40			2	1	1	1
Total	**75 Marks**						

ESE Practical Pattern (UG)

The End Semester Examination will be conducted for a maximum of 75 marks with a maximum 15 marks for the record and other submissions if any.

Practical Components	**Marks**	**K level**
Practical Execution	60 Marks	K5
Record	15 Marks	K2
Total	**75 Marks**	

Submission of Record note books for Practical Examinations

Submission of bonafide record note books is mandatory to appear for the practical examination. If a candidate is unable to submit the record note book on valid grounds, she may be permitted to appear for the practical examinations, provided the head of the department certifies that the candidate has performed the experiments prescribed for the course and she will be awarded zero (0) marks for record note book.

Rubrics for Assessments

Rubrics for Assessment

Standard 4-Level Performance Scale

Level	Descriptor	Score Range (Illustrative)
Level 4	Excellent	80–100% of component marks
Level 3	Good	60–79%
Level 2	Satisfactory	40–59%
Level 1	Needs Improvement	Below 40%

1. Theory

End Semester Examination (ESE)

Section	K-Level	Criteria	Level 4 (Excellent)	Level 3 (Good)	Level 2 (Satisfactory)	Level 1 (Needs Improvement)
SEC A (Theory / Knowledge)	K1 – K2	Knowledge recall & understanding	Thorough understanding across all required cognitive levels	Good understanding, minor gaps	Basic understanding, limited depth	Inadequate or incorrect understanding
SEC B (Application & Analysis)	K3 – K5	Problem-solving, application of concepts, analytical reasoning	Accurately applies concepts, strong logical reasoning, handles problems independently	Mostly correct application, minor errors, reasonable reasoning	Partial application, procedural errors, limited reasoning	Unable to apply concepts, incorrect, poor reasoning
SEC C (Comprehensive / Higher-Order Tasks)	K3 – K6	Analytical reasoning, creation, problem-solving, innovation	Clear logical reasoning, structured solutions, innovative or optimized solutions	Reasonable logic with minor gaps, mostly correct solutions	Limited reasoning, basic attempt at solution	Poor or no reasoning, incorrect or missing solutions

Continuous Internal Assessment (CIA)

Section	K-Level	Criteria	Level 4 (Excellent)	Level 3 (Good)	Level 2 (Satisfactory)	Level 1 (Needs Improvement)
SEC A (Theory / Knowledge)	K1 – K2	Knowledge recall & understanding	Thorough understanding across all required cognitive levels	Good understanding, minor gaps	Basic understanding, limited depth	Inadequate or incorrect understanding
SEC B (Application & Analysis)	K3 – K5	Problem-solving, application of concepts, analytical reasoning	Accurately applies concepts, strong logical reasoning, handles problems independently	Mostly correct application, minor errors, reasonable reasoning	Partial application, procedural errors, limited reasoning	Unable to apply concepts, incorrect, poor reasoning
SEC C (Comprehensive / Higher-Order Tasks)	K3, K4, K6	Analytical reasoning, creation, problem-solving, innovation	Clear logical reasoning, structured solutions, innovative or optimized solutions	Reasonable logic with minor gaps, mostly correct solutions	Limited reasoning, basic attempt at solution	Poor or no reasoning, incorrect or missing solutions

2. Internal Components – Other Activities

Component	K-Level	Criteria	Level 4	Level 3	Level 2	Level 1
Assignment	K5	Application & Problem Solving	Strong solutions, accurate	Mostly correct	Partial	Incorrect / missing
Seminar / Presentation	K6	Creation, Communication & Analysis	Insightful, professional, confident	Good, minor gaps	Basic	Poor / incomplete
ICT Quiz	K2	Knowledge & Application	Accurate & confident	Mostly correct	Basic	Incorrect
Attendance	—	Participation & Punctuality	Full attendance, punctual	Mostly present	Occasional	Poor / frequently absent

3. Practical

Continuous Internal Assessment (CIA)

Component	Bloom's Level	Level 4 (Excellent)	Level 3 (Good)	Level 2 (Satisfactory)	Level 1 (Needs Improvement)
Model Practical (Converted to 10)	K5	Independent execution, accurate results, strong analysis, handles unexpected issues confidently	Minor errors, mostly accurate, guided problem-solving	Performs with guidance, partial understanding, limited analysis	Unable to perform, inaccurate results, no reasoning
Internal Viva	K4	Strong conceptual knowledge, clear reasoning, confident troubleshooting	Good understanding, minor gaps, can handle problems with guidance	Basic understanding, limited problem-solving	Weak knowledge, unable to respond or reason
Lab Performance	K4	Active participation, consistent improvement, skillfully applies concepts	Mostly regular participation, moderate improvement	Irregular, minimal improvement	Rarely participates, no skill growth
Attendance	—	Full attendance, punctual	Mostly present	Occasionally absent	Frequently absent

End Semester Practical Examination (ESE)

Component	Bloom's Level	Level 4 (Excellent)	Level 3 (Good)	Level 2 (Satisfactory)	Level 1 (Needs Improvement)
Practical Execution	K5	Accurate execution, proper procedure, precise results, handles unexpected issues confidently	Minor errors, mostly correct, can handle problems with help	Multiple errors, partial results, limited troubleshooting	Incorrect procedure, unable to execute, fails completely

Record Verification	K2	Complete experiments, accurate results, correct interpretation, neat & structured	Minor omissions, minor errors, mostly clear	Incomplete, errors present, basic clarity	Very incomplete, incorrect, untidy
External Viva	K4	Strong theoretical knowledge, clear understanding & application, confident reasoning	Good understanding, minor gaps, partial application	Basic knowledge, limited linkage to experiment	Weak knowledge, unable to explain or apply concepts

4. Projects

Continuous Internal Assessment (CIA)

Component	Bloom's Level	Level 4 (Excellent)	Level 3 (Good)	Level 2 (Satisfactory)	Level 1 (Needs Improvement)
Project Proposal Presentation	K3	Clear, focused problem definition; well-defined objectives; feasible plan; confident presentation	Minor gaps in clarity or planning; mostly clear	Broad or partially defined problem; basic objectives; basic presentation	Vague/unclear problem; objectives missing; poor presentation
Periodic Review / Progress Evaluation	K4	Consistent, timely progress; correct application; identifies & resolves issues independently; systematic documentation; proactive	Minor delays, minor guidance needed, mostly updated documentation; moderately proactive	Irregular progress, partial application, needs support, basic documentation	Very limited progress, incorrect application, passive, poor documentation
Project Report Draft Submission	K6	Well-structured report; accurate understanding; adequate data; logical analysis; proper referencing & presentation	Minor structural or conceptual gaps; minor data issues; reasonable analysis; minor formatting issues	Basic structure; partial understanding; limited data; basic analysis; basic formatting	Poorly organized; incorrect understanding; insufficient data; no analysis; poor presentation

End Semester Examination (ESE)

Component	Bloom's Level	Level 4 (Excellent)	Level 3 (Good)	Level 2 (Satisfactory)	Level 1 (Needs Improvement)
Final Project Report Evaluation (External)	K6	Topic relevant & meaningful; accurate application of concepts; adequate & relevant data; logical analysis; effective problem-solving; professional formatting	Mostly relevant; minor conceptual errors; minor gaps in data; mostly logical; reasonable solutions; minor formatting issues	Moderately relevant; basic application; limited data; basic analysis; basic problem-solving; basic formatting	Poor relevance; incorrect application; insufficient data; weak analysis; no solution; poor formatting
External Viva Voce	K5	Thorough understanding; strong linkage to project; logical reasoning; confident & accurate responses; professional communication	Minor gaps in understanding or reasoning; mostly correct answers; acceptable communication	Basic understanding; limited linkage; basic reasoning; limited answers; basic communication	Weak understanding; no linkage; no reasoning; unable to respond; poor communication

SYLLABUS

FIRST SEMESTER

Course Code	Course Title	Hours			Credits
		Total	Lecture	Examination	
AI26C01	**Core I: Java Programming**	**75**	**70**	**5**	**4**

Preamble

- Introduces fundamental concepts of Java programming and object-oriented concepts used in modern software development.
- Focuses on core programming constructs, classes and objects, inheritance, exception handling, and file processing.
- Develops students logical thinking and problem-solving skills through practical Java application development.
- Prepares learners to design and implement platform-independent software solutions.

Prerequisite

Basic knowledge of computer fundamentals and programming concepts such as variables, data types, operators, and control structures.

Course Learning Outcomes

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

CLO No	Course Learning Outcome	Bloom's Level
CLO1	Recall the fundamental concepts of Object-Oriented Programming, Java basics, JVM, programming constructs, interfaces, exception handling, file I/O, and graphics programming.	K1
CLO2	Explain Java programming constructs, OOP principles, interfaces, multithreading concepts, exception handling mechanisms, file operations, and GUI components using AWT and Swing.	K2
CLO3	Apply Java programming constructs, classes, inheritance, interfaces, exception handling, and file handling techniques to develop simple programs.	K3
CLO4	Develop Java applications using multithreading, packages, and event handling to solve real-world problems.	K4

CLO5	Analyze and design GUI-based applications using AWT, Swing, layout managers, and graphics programming concepts.	K5
CLO6	Create and evaluate complete Java applications integrating OOP concepts, file handling, multithreading, and GUI components.	K6
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create		

Unit-wise CLO Mapping

Unit	Coverage	Mapped CLOs
Unit I	Introduction to Object-Oriented Programming, Java Basics, JVM, Program Structure	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit II	Java Programming Constructs, Classes and Object-Oriented Concepts	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit III	Interfaces, Packages, and Multithreading in Java	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit IV	Exception Handling and File Input/Output in Java	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit V	AWT, Swing, Graphics, Layout Managers, Event Handling	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6

Alignment of CLO with PLO

3 = High, 2 = Medium, 1 = Low, – = Not Applicable

CLO \ PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	2	1	1	1	1	1	1	1	1
CLO2	3	3	2	1	1	1	1	1	1	1
CLO3	3	3	3	2	2	1	1	1	1	1
CLO4	3	3	3	3	2	1	1	1	1	1
CLO5	3	3	3	3	3	2	1	1	1	1
CLO6	3	3	3	3	3	2	1	1	2	2

Core I: Java Programming (70 Hours)

UNIT I **(14 Hrs.)**

Introduction to Object-Oriented Programming and Java Fundamentals

Object-Oriented Paradigm, Basic Concepts of Object-Oriented Programming, Benefits of Object-Oriented Programming, Application of Object-Oriented Programming. Java Evolution: History, Features, Comparison of Java with C and C++. Java and Internet, Java and World Wide Web, Web Browsers. Overview of Java: Simple Java program, Structure, Java Tokens, Statements, Java Virtual Machine.

UNIT II **(14 Hrs.)**

Java Programming Constructs and Object-Oriented Concepts

Constants, Variables, Data Types - Operators and Expressions – Decision Making and Branching: if, if...Else, nested if, switch, ?: operator. Decision Making and Looping: while, do, for – **Labelled loops.** Classes, objects and methods: Introduction - Defining a class - method declaration - creating objects - accessing class methods - method overloading - nesting of methods – inheritance - overriding methods

UNIT III **(14 Hrs.)**

Interfaces, Packages, and Multithreading in Java

Multiple Inheritance: Introduction - Defining Interfaces - Extending interfaces-implementing interfaces - Accessing interface variables – packages - Introduction-using system packages-java API packages- creating packages-accessing a package- multi threaded – creating Thread- Life cycle of a Thread

UNIT IV **(14 Hrs.)**

Exception Handling and File Input/Output in Java

Exception handling code- multiple catch statements-using finally statements-managing Input and Output files- Introduction – creation of files-Reading /Writing character- Reading/Writing bytes-Concatenating and Buffering Files – Random Access File

UNIT V **(14 Hrs)**

Graphics Programming Using AWT, Swing and Layout Manager

Introduction – The Graphics Class: Lines, Rectangles, Circles, Ellipses – Drawing Arcs – Drawing Polygons – Line Graphs – Using Control Loops in Applets – Drawing Bar Charts. Introduction to AWT Packages – Window Fundamentals – Closing an AWT Window or Frame – Working with Applets – Working with Fonts – Layout Managers – Handling Events on AWT Components – Introduction to Swing Package – Components and Containers.

Simulations

1. Traffic Light Simulation using Applet
2. Bouncing Ball Simulation using Applet
3. Simple Drawing Simulation using Applet
4. Bar Chart Simulation using Applet
5. Mouse Click Simulation using Applet

*** Course Alignment with SDGs: 4**

TEXTBOOKS

S.No	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	E.Balaguruswamy	Programming with JAVA (Unit I, II, III, IV, V)	Mc-Graw Hill Professional	2023, 7th Edition

REFERENCE BOOK

S. No	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR & EDITION
1	Walter Savitch,	Java: An Introduction to Problem Solving and Programming	Pearson Education Ltd	2019, 8th Edition, Reprint.
2	Cay. S. Horstmann	Core Java Volume I Fundamentals	Pearson Education	2018,11th Edition, Reprint.
3	Herbert Schildt	Java: A Beginner's Guide	McGraw Hill Education	2018, 8th Edition, Reprint.

Pedagogy

The course will be delivered using a combination of traditional and learner-centered teaching methods, including:

- Lecture - Chalk and Talk
- PowerPoint presentations
- E-content and digital learning resources
- Group discussions

- Assignments
- Quizzes
- Peer learning activities
- Student seminars

Course Content and Lecture Schedule

Module No	Topics	CLO Level	K Level	No. of Hrs.	Content Delivery Methods	Learning Methods
UNIT I (14 Hrs)						
1	Fundamentals of Object-Oriented Programming:	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Discussion, Lecture	Participatory Learning
2	Object-Oriented Paradigm	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, Peer teaching	Participatory Learning
3	Basic Concepts of Object-Oriented Programming	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	PPT, Discussion	Participatory Learning
4	Benefits of Object-Oriented Programming	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Brainstorming	Participatory Learning
5	Application of Object-Oriented Programming.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Problem-based Learning
6	Java Evolution: History, Features	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Chalk & talk, PPT, Seminar	Participatory Learning
7	Comparison of Java with C and C++	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Discussion, Lecture	Experiential Learning
8	Java and Internet, Java and World Wide Web, Web Browsers, Overview of Java: Simple Java program	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Flipped Classroom, Discussion	Experiential Learning
9	Structure, Java Tokens	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Discussion, Lecture	Experiential Learning
10	Statements	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture, PPT	Problem-based Learning
11	Java Virtual Machine	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Discussion, Lecture	Problem-based Learning
Unit – II (14 Hrs)						
12	Constants, Variables, Datatypes	CLO1, CLO2, CLO3, CLO4,	K1, K2, K3, K4,	1	Lecture, PPT,	Participatory Learning

		CLO5, CLO6	K5, K6		Discussion	
13	Operators and Expressions	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Problem-based Learning
14	Decision Making and Branching:	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Participatory Learning
15	if, if...Else, nested if, switch, ?: operator	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	PPT, Lecture	Experiential Learning
16	Decision Making and Looping: While, do	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Problem based Learning
17	For, labelled loops	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Chalk & Talk, Demonstration, PPT,	Problem-based Learning
18	Classes, objects and methods: Introduction	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT, Video	Problem-Based Learning
19	Defining a class, Method declaration	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Chalk & Talk, Assignment, PPT	Participatory Learning
20	Creating objects, Accessing class methods	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Chalk & Talk, Seminar, PPT	Problem-Based Learning
21	Method overloading	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Problem-based Learning
22	Nesting of methods	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture, PPT	Problem-based Learning
23	Inheritance	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Chalk & Talk, Seminar, PPT	Problem-Based Learning
24	Overriding methods	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Chalk & Talk, Seminar, PPT	Problem-Based Learning
Unit III (14 Hrs)						
25	Interfaces: Multiple Inheritance:	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture, Demonstrations	Experiential Learning
26	Introduction	CLO1, CLO2, CLO3, CLO4,	K1, K2, K3, K4,	1	Video, Observation	Experiential Learning

		CLO5, CLO6	K5, K6			
27	Defining Interfaces	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture	Experiential Learning
28	Extending interfaces	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Demonstration	Experiential Learning
29	Implementing interfaces	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Seminar, PPT	Participatory Learning
30	Accessing interface variables	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Participatory Learning
31	Packages	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Demonstration	Problem based Learning
32	Introduction-using system packages, java API packages	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Demonstration	Problem based Learning
33	Creating packages, accessing a package, multi-threaded	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Discussion, Demonstrations	Problem based Learning
34	Creating Thread	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture, PPT	Experiential Learning
35	Life cycle of a Thread	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Participatory Learning
Unit IV (14 Hrs)						
36	Exception-Exception handling code	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture, PPT	Problem based Learning
37	Multiple catch statements	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Seminar, PPT	Problem based learning
38	Using finally statements	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Discussion	Problem based Learning
39	Managing Input and Output files	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Participatory Learning
40	Introduction	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Seminar, PPT	Participatory Learning
41	Creation of files	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Participatory Learning
42	Reading character	CLO1, CLO2, CLO3, CLO4,	K1, K2, K3, K4,	1	Lecture, PPT,	Participatory Learning

		CLO5, CLO6	K5, K6		Demonstration	
43	Writing character	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT, Demonstration	Problem based Learning
44	Reading bytes, Writing bytes	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Discussion	Experiential Learning
45	Concatenating	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT, Demonstration	Problem based Learning
46	Buffering Files	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Discussion	Experiential Learning
Unit V (14 Hrs)						
47	Introduction	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Participatory Learning
48	The Graphics Class: Lines, Rectangles, Circles, Ellipses	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture, Demonstration	Problem based Learning
49	Drawing Arcs, Drawing Polygons, Line Graphs	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Discussion, Demonstration	Problem based Learning
50	Using Control Loops in Applets, Drawing Bar Charts	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, Demonstration	Participatory Learning
51	Introduction to AWT Packages	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, Demonstration	Participatory Learning
52	Window Fundamentals	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Participatory Learning
53	Closing an AWT Window or Frame	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, Demonstration	Experiential Learning
54	Working with Applets	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture, Demonstration	Participatory Learning
55	Working with Fonts, Layout Managers	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture PPT, Demonstration	Problem based Learning
56	Handling Events on AWT components	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture PPT, Demonstration	Experiential Learning

57	Introduction to Swing Package	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Participatory Learning
58	Components and Containers	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture, PPT	Participatory Learning

Course Designers & Teaching–Learning Strategies

Course Code & Title	**AI26C01, Core I: Java Programming**
Course Designers	Dr. S. Meera, Mrs. M. Loganayaki
Teaching–Learning Strategies	Participatory Learning: 33%
	Experiential Learning: 33%
	Problem-based Learning: 34%

Course Code	Course Title	Hours			Credits
		Total	Practical	Examination	
AI26CP1	**Core Practical I: Java Programming Lab**	**60**	**57**	**3**	**2**

Preamble

This course provides hands-on experience in implementing Java programs using object-oriented concepts and core programming constructs.

Prerequisite

Basic knowledge of computer fundamentals and programming concepts such as variables, data types, and control structures.

Course Learning Outcomes

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

CLO No	Course Learning Outcome	Bloom's Level
CLO1	Recall basic Java concepts including OOP, control statements, inheritance, interfaces, packages, strings, events, threads, exceptions, and file handling.	K1
CLO2	Explain the working of Java constructs such as classes, control structures, inheritance, interfaces, strings, events, threads, exceptions, and file operations.	K2
CLO3	Apply Java concepts to develop programs using OOP, control statements, inheritance, interfaces, strings, event handling, multithreading, exception handling, and file I/O.	K3
CLO4	Analyze Java programs for appropriate use of OOP concepts, control logic, threads, exceptions, and file handling.	K4
CLO5	Evaluate Java programs for correctness and efficiency in solving problems using various programming techniques.	K5
CLO6	Design and develop integrated Java applications using OOP, event handling, multithreading, exception handling, and file operations.	K6
K1 - Remember; **K2 -** Understand; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate; **K6** –		

Create

Unit-wise CLO Mapping

Experiment No	Programs	Mapped CLOs
1	Exercises using Classes and Objects	CLO1, CLO2, CLO3, CLO4, CLO5
2	Exercises using Control Statements	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
3	Exercises using Different Inheritance	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
4	Exercises using Interfaces	CLO1, CLO2, CLO3, CLO4, CLO5
5	Exercises using Packages	CLO1, CLO2, CLO3, CLO4, CLO5
6	Exercises using String Functions	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
7	Exercises using Mouse Events	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
8	Exercises using Thread Methods	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
9	Exercises to Implement Exception Handling	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
10	Exercises to Implement File Read and Write Methods	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
11	Exercises to create a Calculator using AWT	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
12	Exercise to draw different shapes using Applet	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6

Alignment of CLO with PLO

3 = High, 2 = Medium, 1 = Low, – = Not Applicable

CLO \ PLO	PLO 1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	1	1	1	1	1	1	1	1	1

CLO2	3	2	1	1	1	1	1	1	1	1
CLO3	2	3	2	1	2	1	1	1	1	1
CLO4	2	3	2	2	2	1	1	1	1	1
CLO5	1	2	3	2	2	1	1	1	1	1
CLO6	1	2	3	3	3	1	1	1	2	2

LIST OF EXERCISES:

1. Exercises using classes and objects
2. Exercises using control statements
3. Exercises using different inheritance
4. Exercises using interfaces
5. Exercises using packages
6. Exercises using string functions
7. Exercises using mouse events
8. Exercises using thread methods
9. Exercises to implement Exception Handling
10. Exercises to implement files using Read and Write methods
11. Exercises to create a Calculator using AWT
12. Exercise to draw different shapes using Applet

PEDAGOGY
Demonstrations

Course Content and Lecture Schedule

Module No	Topics	CLO Level	K Level	No. of Hrs.	Content Delivery Methods	Learning Methods
1	Exercises using Classes and Objects	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	3	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
2	Exercises using Control Statements	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1,K2, K3,K4, K5, K6	4	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning

3	Exercises using Different Inheritance	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
4	Exercises using Interfaces	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
5	Exercises using Packages	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
6	Exercises using String Functions	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
7	Exercises using Mouse Events	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
8	Exercises using Thread Methods	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
9	Exercises to Implement Exception Handling	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
10	Exercises to Implement File Read and Write Methods	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
11	Exercises to create a Calculator using AWT	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning
12	Exercise to draw different shapes using Applet	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Lab Exercises, Demonstrations, Hands-On Session	Problem-based Learning

Course Designers & Teaching–Learning Strategies

Course Code & Title	**AI26CP1, Core Practical I: Java Programming Lab**
Course Designers	Dr. S. Meera, Ms. M. Loganayaki
Teaching–Learning Strategies	Experiential Learning: 100 %

Course Code	Course Title	Hours			Credits
		Total	Lecture	Examination	
AP26C02	**Core II: OPERATING SYSTEMS**	**75**	**70**	**5**	**4**

Preamble

- Introduces the fundamental concepts and functions of operating systems and their role in managing computer hardware and software resources.
- Emphasizes core operating system mechanisms such as process management, CPU scheduling, synchronization, deadlock handling, and memory management techniques.
- Students learn how operating systems coordinate processes, allocate system resources efficiently, and ensure reliable program execution.
- The course also introduces the Linux operating system environment, focusing on shell usage, command execution, and file system navigation through command-line tools.
- It develops analytical skills required to understand system-level operations and provides a foundation for advanced studies in systems programming, networking, and distributed computing.

Prerequisite

Students should possess basic knowledge of computer fundamentals, system components, and logical reasoning to understand operating system concepts and command-line computing environments.

Course Learning Outcomes (CLOs)

CLO No	Course Learning Outcome	Bloom's Level
CLO1	Recall the fundamental concepts of operating systems, process scheduling and synchronization, memory management strategies, Linux shell operations, and file system navigation commands	K1
CLO2	Explain OS concepts, interpret scheduling and synchronization, describe memory strategies, understand Linux shell operations, and illustrate file system navigation.	K2
CLO3	Apply OS concepts in process scheduling and synchronization, implement memory management techniques, use Linux shell	K3

	commands for administration, and perform file system operations in practical case studies.	
CLO4	Evaluate scheduling, synchronization, and memory management techniques, assess Linux shell efficiency, and judge file system operations for reliability and performance	K4
CLO5	Analyze operating system functions, differentiate scheduling and synchronization methods, examine memory and virtual memory techniques, compare Linux shell operations, and evaluate file system commands through case studies.	K5
CLO6	Integrate scheduling, IPC and synchronization for efficient performance and deadlock handling while designing memory management, Linux scripts, and file systems for practical solutions.	K6
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create		

Unit-wise CLO Mapping

Unit	Coverage	Mapped CLOs
Unit I	Introduction to Operating Systems, System Architecture, Process Concept, Process Scheduling, Interprocess Communication	CLO1, CLO2, CLO3, CLO4, CLO5
Unit II	CPU Scheduling Algorithms, Synchronization, Critical Section Problem, Semaphores, Deadlocks	CLO1, CLO2, CLO3, CLO4, CLO5
Unit III	Memory Management, Contiguous Allocation, Paging, Virtual Memory, Page Replacement Algorithms	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit IV	Linux Fundamentals, Shells, Terminal Commands, Command History, Shell Variables, System Administration Case Studies	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit V	Linux File System Navigation, File Management Commands, Meta Characters, File Organization and Storage Management	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6

Alignment of CLO with PLO

3 = High, 2 = Medium, 1 = Low, – = Not Applicable

CLO \ PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	1	1	1	1	1	1	1	1	1
CLO2	3	2	1	1	1	1	1	1	1	1
CLO3	2	3	2	3	1	1	1	1	2	1
CLO4	2	3	2	2	1	1	1	1	2	1

CLO5	2	3	2	2	1	2	1	1	2	1
CLO6	1	2	3	3	2	2	2	1	3	2

Core II: Operating Systems (AP26C02) (70 Hrs)

UNIT I **14 Hrs**

Introduction: Importance and role of operating systems - Computer System Architecture – Operating System Operations. Process Management: Process Concept - Process Scheduling - Interprocess communication.

UNIT II **14 Hrs**

Process Scheduling: Basic Concepts- Preemptive and Non-Preemptive Scheduling - Scheduling Algorithms (FCFS, SJF & Round Robin only). Synchronization: Back ground-The Critical Section Problem-Peterson's Solution- Semaphores- Deadlock: Deadlock Characterization - Methods Handling Deadlocks - Recovery from Deadlock.

UNIT III **14 Hrs**

Memory Management Strategies: Background-Contiguous Memory Allocation-Paging.

Virtual Memory Management: Demand Paging - Page Replacement - Basic Page Replacement, FIFO Page Replacement, Optimal Page Replacement.

UNIT IV **14 Hrs**

Understanding Linux Is – Becoming a Linux Power User: About Shells and Terminal Windows-Choosing your shell - Running Commands - Recalling Commands Using Command History - Connecting and Expanding Commands -Using Shell Variables.

Case Studies:

Developer Productivity: Evaluating which shell (Bash, Zsh, Fish, etc.) improves workflow efficiency. System Administration: Performing administrative tasks without relying on a graphical interface.
Command History Utilization: Reducing wasted effort by recalling and reusing commands instead of retyping. Single Command Execution: Completing tasks efficiently using one well-structured command. Storage Management: Addressing student complaints about full server storage using shell tools and commands.

UNIT V **14 Hrs**

Moving Around the File system: Using Basic File system Commands - Using Meta characters and Operators - Listing Files and Directories - Moving, Copying, and Removing Files.

Case Studies:

Student Navigation Challenge: Evaluating how a student can learn to move between directories in the Linux file system using commands like cd and pwd.

Administrator File Audit: Performing administrative tasks such as checking file permissions, size, and ownership using ls -lh and stat.

Developer File Safety: Ensuring safe modification of files by creating a copy before editing with cp. File Organization Task: Moving files to the correct directory using mv to maintain proper structure.

Storage Cleanup: Deleting unwanted files safely using rm or safer alternatives like trash-cli to free up storage space.

*** Course Alignment with SDGs: 4**

Text Books

S. No	Authors	Title of the Book	Publisher	Year & Edition
1	Abraham Silberschatz, Peter Baer Galvin, G Gagne	OPERATING SYSTEMS CONCEPTS	Wiley Publishers	2018, 10th Edition
2	Christopher Negus	LINUX BIBLE	Wiley Publishers	2010, 10th Edition

Reference Books

S. No	Authors	Title of the Book	Publisher	Year & Edition
1	Archer J harries	Operating System	Tata Mc Graw Hill	2011, 2nd Edition
2	Williams E. Shotts	The Linux Command Line: A Complete Introduction	John Wiley & Sons	2019, 2nd Edition
3	Jason Cannon	Linux for Beginners	Create space Independent Pub	2014,1st Edition

Related Online References

CASE STUDIES:

1. **https://labex.io/tutorials/shell-how-to-switch-between-bash-and-zsh-shells-in-the-webide-414823**
2. **https://computing.stat.berkeley.edu/tutorial-using-bash/**
3. **https://www.geeksforgeeks.org/linux-unix/cd-command-in-linux-with-examples/**

4. **https://www.penguintutor.com/linux/useful-command-reference**
5. **https://kalitut.com/linux-commands-for-beginners-course/**

Pedagogy

The course will be delivered using a combination of traditional and learner-centered teaching methods, including:

- Lecture - Chalk and Talk
- PowerPoint presentations
- E-content and digital learning resources
- Numerical problem-solving exercises
- Group discussions
- Assignments
- Quizzes
- Peer learning activities
- Student seminars

Course Designers &Teaching–Learning Strategies

Course Code & Title	**AP26C02, Core II:** Operating Systems Fundamentals – Linux
Course Designers	Mrs. T. S. Anushya Devi, Dr. G. Dhivya
Teaching–Learning Strategies	Participatory Learning: 45 %
	Experiential Learning: 36 %
	Problem-based Learning: 19 %

Course Contents and Lecture Schedule

Module No.	Topic	CLO level	K Level	No. of Hrs	Content delivery method	Learning Methods
Unit I (14 Hrs)						
1	Introduction: Importance and role of operating systems	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Discussion / Lecture / Brain storming	Participatory Learning
2	Computer System Architecture	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / Visual diagrams	Participatory Learning

3	Operating System Operations	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT	Problem based Learning
4	Process Management:	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Chalk and talk / Seminar/ Roleplay/ Discussion	Experiential Learning
5	Process Concept	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Discussion/ Lecture	Experiential Learning
6	Process Scheduling	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT//Peer teaching	Problem based Learning
7	Inter process communication	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / Examples	Experiential Learning
	Unit II (14 Hrs)					
8	Process Scheduling: Basic Concepts-	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT / Discussion	Participatory Learning
9	Preemptive and Non preemptive Scheduling	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture – Chalk and Talk	Participatory learning
10	Scheduling Algorithms (FCFS)	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture/PPT	Experiential Learning
11	Scheduling Algorithms (SJF)	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture / Demonstration	Problem based Learning
12	Scheduling Algorithms (Round Robin)	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Chalk and Talk / PPT/ Seminar	Problem-Based Learning
13	Synchronization – Background	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture / PPT	Experiential Learning
14	The Critical Section Problem	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture / Demonstration	Experiential Learning
15	Peterson's Solution	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture/ Chalk & Talk	Problem-based Learning
16	Semaphores	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture / PPT/	Experiential Learning

					demonstration	
17	Deadlock Characterization	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture - Chalk & Talk	Participatory Learning
18	Methods for Handling Deadlocks	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture / Case study	Experiential Learning
19	Recovery from Deadlock	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Lecture / Case study	Experiential Learning
Unit III (14 Hrs)						
20	Memory Management Strategies: Background	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT	Participatory Learning
21	Contiguous Memory Allocation-Paging.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture/ videos	Participatory Learning
22	Virtual memory management - Demand paging -	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Discussion / Video	Participatory Learning
23	Page Replacement	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT	Problem-based Learning
24	Basic Page Replacement	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT	Participatory Learning
25	FIFO Page Replacement	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT	Participatory Learning
26	Optimal Page Replacement	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT/ Live demonstration	Experiential Learning
Unit IV (14 Hrs)						
27	Understanding Linux Is	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Video / Observation	Experiential Learning
28	Becoming a Linux Power User: About Shells and Terminal Windows	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture/ PPT/ Demonstration	Participatory Learning
29	Choosing your shell	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture PPT	Experiential Learning
30	Running Commands	CLO1, CLO2, CLO3, CLO4,	K1, K2, K3, K4,	2	Lecture/ PPT/	Participatory Learning

		CLO5, CLO6	K5, K6		Demonstration	
31	Recalling Commands Using Command History	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture PPT/ Demonstration	Participatory Learning
32	Connecting and Expanding Commands	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture/PPT	Experiential Learning
33	Using Shell Variables.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / Demonstration	Problem based Learning
Unit V (14 Hrs)						
34	Moving Around the File system	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture PPT	Experiential Learning
35	Using Basic File system Commands	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Seminar / PPT	Participatory Learning
36	Using Meta characters	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture/PPT/ Demonstration	Participatory Learning
37	Using Operators	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture/ PPT/ Demonstration	Participatory Learning
38	Listing Files and Directories	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture PPT	Problem based Learning
39	Moving Files.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Video/ Demonstration	Experiential Learning
40	Copying Files	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Video/ Demonstration	Experiential Learning
41	Removing Files	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Video/ Demonstration	Experiential Learning

Name of the course	Operating Systems Fundamentals - Linux
Name of the Faculty	Mrs.T.S.Anushya Devi, Dr. G. Dhivya
Participatory Learning	39 %
Experiential Learning	41 %
Problem-based Learning	20 %

Course Code	Course Title	Hours			Credit
		Total	Lecture	Examination	
TH26A04	**LINEAR ALGEBRA**	93	88	**5**	**5**

Preamble

- This course introduces fundamental concepts of linear algebra essential for Artificial Intelligence and computational problem solving.
- It focuses on systems of linear equations, vector spaces, matrices, and eigenvalues, which form the mathematical foundation for many AI techniques.
- Students will develop analytical and problem-solving skills through structured mathematical reasoning.
- The course also emphasizes applications of linear algebra in real-world scenarios such as data representation and transformations.
- It prepares learners for advanced topics in machine learning, data science, and optimization.

Prerequisite

Basic knowledge of algebra, equations, and elementary mathematical operations.

Course Learning Outcomes (CLO's)

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

CLO No	Course Learning Outcome	Bloom's Level
CLO1	Recall definitions and fundamental concepts of matrices, vectors, and systems of linear equations.	K1
CLO2	Explain properties of vector spaces, linear independence, basis, and matrix operations.	K2
CLO3	Apply matrix methods and vector operations to solve systems of linear equations and related problems.	K3
CLO4	Analyze vector spaces, subspaces, and inner product spaces to determine structure and relationships.	K4
CLO5	Evaluate eigenvalues, eigenvectors, and diagonalization techniques for different matrices.	K5
CLO6	Construct mathematical models using linear algebra concepts to represent and solve real-world problems.	K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create		

Unit-wise CLO Mapping

Unit	Coverage	Mapped CLOs
Unit I	Systems of Linear Equations, Gaussian Elimination, Matrix Algebra	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit II	Euclidean Space, Linear Independence, Basis	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit III	General Vector Spaces, Subspaces, Dimension	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit IV	Inner Product Spaces, Orthogonality, Orthonormal Bases	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit V	Eigenvalues, Eigenvectors, Diagonalization	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6

Alignment of CLO with PLO
3 = High, 2 = Medium, 1 = Low, – = Not Applicable

CLOs/ PLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PL06	PLO7	PLO8	PLO9	PLO10
CLO1	3	1	1	1	1	1	1	1	1	1
CLO2	3	1	1	1	1	1	1	1	1	1
CLO3	3	2	2	1	1	1	1	1	1	1
CLO4	3	1	3	1	1	1	1	1	1	1
CLO5	3	1	2	2	1	1	1	1	1	1
CLO6	3	2	2	2	2	2	1	1	1	2

Allied Linear Algebra (TH26A04)

Unit I **18 hrs**

Linear Equations and Matrices: Systems of Linear Equations, Gaussian Elimination, Vector Arithmetic, Arithmetic of Matrices, Matrix Algebra, The Transpose and Inverse of a Matrix, Types of Solutions, The Inverse Matrix Method

Unit II **17 hrs**

Euclidean Space: Properties of Vectors, Further Properties of Vectors, Linear Independence, Basis and Spanning Set

Unit III **18 hrs**

General Vector Spaces: Introduction to General Vector Spaces, Subspace of a Vector Space, Linear Independence and Basis, Dimension

Unit IV **17 hrs**

Inner Product Spaces: Introduction to Inner Product Spaces, Inequalities and orthogonality, Orthonormal Bases, Orthogonal Matrices.

Unit V **18 hrs**

Eigen values and Eigenvectors: Determinant of a Matrix, Introduction to Eigen values and Eigenvectors, Properties of Eigen values and Eigenvectors, Diagonalization, Diagonalization of Symmetric Matrices.

**** Course Alignment with SDGs: 3, 4, 7, 8, 9, 11, 13**

Text Book

S. No	Author	Title of the book	Publishers	Edition & Year
1	Kuldeep Singh	Linear Algebra Step by Step	Oxford University Press	2014
	Unit I: Chapter I, Unit II: Chapter II, Unit-III: Chapter III 3.1-3.4, Unit-IV: Chapter IV, Unit-V: Chapter VI - 6.1, Chapter VII -7.1-7.4			

Reference Books

S. No	Author	Title of the book	Publishers	Edition & Year
1	Gilbert Strang	Introduction to Linear Algebra	Wellesley-Cambridge Press	2016, 5th Edn.
2	David C. Lay, Steven R. Lay, Judi J. Mc Donald	Linear Algebra and Its Applications	Pearson Education	2014

3	David C. ay. Steven R. Lay. Jud J. McDonald	Linear Algebra and Its Applications	Pearson	2014, 5th Edn.

Pedagogy

- Lecture – Chalk and Talk
- PowerPoint Presentations
- Real-World Applications
- Group discussions and peer teaching.
- Mini-projects (e.g., applications of matrices or eigenvalues).
- Presentation-based learning to improve communication skills.
- Assignments and Seminars.
- Periodic quizzes and tests.
- Problem-solving sessions and discussions.

Module No.	Topic	CLOs	K Level	No. of hours	Content Delivery Methods	Learning Methods
UNIT I (18 Hrs)						
1	**Linear Equations and Matrices:** Systems of Linear Equations, Gaussian Elimination	CLO1, CLO2, CLO3	K1, K2 K3	4	Lecture, Chalk and talk	Experiential Learning
2	Vector Arithmetics, Arithmetic of Matrices	CLO1, CLO2	K1, K2	2	Lecture, PPT	Participatory Learning
3	Matrix Algebra	CLO2, CLO3	K2, K3	2	Lecture, Discussion	Problem-based Learning
4	The Transpose and Inverse of a Matrix	CLO1, CLO2, CLO3	K1, K2 K3	3	Lecture, PPT	Problem-based Learning
5	Types of Solutions	CLO1, CLO2, CLO3	K1, K2 K3	3	Lecture, Quiz	Participatory Learning
6	The Inverse Matrix Method	CLO2, CLO3, CLO4, CLO5, CLO6	K2, K3 K4, K5 K6	4	Lecture, Assignment	Problem-based Learning
UNIT II (17 Hrs)						

7	**Euclidean Space:** Properties of Vectors	CLO1, CLO2, CLO3	K1, K2 K3	3	Lecture, PPT, Chalk and Talk	Experiential Learning
8	Further Properties of Vectors	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2 K3, K4 K5, K6	3	Lecture, PPT Assignment	Participatory Learning
9	Linear Independence	CLO1, CLO2, CLO3	K1, K2 K3	4	Lecture, PPT	Problem-based Learning
10	Basis and Spanning Set	CLO2, CLO3, CLO4	K1, K2 K3	3	Lecture, Chalk and Talk	Problem-based Learning
11	Cont. Basis and Spanning Set	CLO2, CLO3, CLO4	K1, K2 K3	4	Lecture, PPT	Problem-based Learning
UNIT III (18 Hrs)						
12	**General Vector Spaces:** Introduction to General Vector Spaces	CLO1, CLO2, CLO3	K1, K2 K3	2	Lecture, PPT	Problem based learning
13	Subspace of a Vector Space	CLO1, CLO2, CLO3	K1, K2 K3	4	Spotters, Chalk and talk	Experiential Learning
14	Linear Independence	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2 K3, K4 K5, K6	5	Lecture, Assignment	Participatory Learning
15	Basis of vector space	CLO1, CLO2, CLO3, CLO4	K1, K2 K3, K4	4	Lecture, Quiz	Problem based learning
16	Dimension	CLO4, CLO5, CLO6	K4, K5 K6	3	Lecture, PPT, Assignment	Participatory Learning
UNIT IV (17 Hrs)						
17	**Inner Product Spaces:** Introduction to Inner Product Spaces	CLO1, CLO2, CLO3	K1, K2 K3	3	Lecture	Participatory Learning
18	Inequalities	CLO2, CLO3	K2, K3	3	Lecture	Participatory Learning
19	Orthogonality	CLO1, CLO2, CLO3	K1, K2 K3	3	Lecture, Chalk and Talk	Problem based learning

20	Orthonormal Bases	CLO1, CLO2, CLO3, CLO4	K1, K2 K3, K4	4	Lecture, PPT	Experiential Learning
21	Orthogonal Matrices	CLO4, CLO5, CLO6	K4, K5 K6	4	Lecture, Chalk and Talk, Assignment	Experiential Learning
UNIT V (18 Hrs)						
22	**Eigen values and Eigen vectors:** Determinant of a Matrix	CLO1, CLO2, CLO3, CLO4	K1, K2 K3, K4	3	Lecture, PPT, Quiz	Participatory Learning
23	Introduction to Eigen values and Eigen vectors	CLO2, CLO3, CLO4	K2, K3 K4	3	Lecture	Problem based learning
24	Properties of Eigen values and Eigen vectors	CLO1, CLO2, CLO3 CLO4	K1, K2 K3, K4	4	Lecture, Assignment	Problem based learning
25	Diagonalization	CLO3, CLO4	K3, K4	4	Lecture	Experiential Learning
26	Diagonalization of Symmetric Matrices	CLO4 CLO5 CLO6	K4, K5 K6	4	Lecture, Assignment	Experiential Learning

Course Designers & Teaching–Learning Strategies

Name of the Course	Linear Algebra
Name of the Faculty	Dr. M. Deepa
Participatory Learning	28%
Experiential Learning	32%
Problem-based Learning	40%

Course Code	Course Title	Hours			Credits
		Total	Lecture	Examination	
NME26ES	Introduction to Entrepreneurship	30	30	-	2

Preamble

- To introduce the basic concepts and importance of entrepreneurship in economic and social development.
- To familiarize students with entrepreneurial traits, types of entrepreneurs, and the process of starting small enterprises.
- To provide awareness about entrepreneurship development programmes, institutional support, and financial assistance available for entrepreneurs.

Prerequisite

- Basic awareness of business activities, economic environment, and interest in entrepreneurial initiatives.

Course Learning Outcomes (CLOs)

CLO No	Course Learning Outcome	Bloom's Level
CLO1	Define the fundamental concepts, characteristics, and types of entrepreneurship and entrepreneurs.	K1
CLO2	Explain the role of entrepreneurship development programmes, institutional support systems, and government incentives for entrepreneurs.	K2
CLO3	Apply creative thinking and innovation techniques to identify entrepreneurial opportunities and solve business problems.	K3
CLO4	Analyze the significance of intellectual property rights and institutional support in promoting entrepreneurial ventures.	K4
CLO5	Evaluate different project ideas and assess their feasibility using basic project appraisal concepts.	K5
CLO6	Develop a basic project report for a small entrepreneurial venture based on identified opportunities.	K6
K1 - Remember; **K2** - Understand; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate; **K6** – Create		

Unit –CLO Mapping

Unit	Coverage	Mapped CLOs
Unit 1	Introduction to Entrepreneurship, factors, barriers, entrepreneurial traits and types, steps for starting small industries, MSMEs, social entrepreneurship	**CLO1, CLO2**
Unit 2	Entrepreneurship Development Programmes, institutional framework (IFCI, ICICI, IDBI, IRBI, EXIM Bank, NSIC, SIDBI, SFC, SIPCOT, TIIC), incentives and subsidies	**CLO1, CLO2, CLO3, CLO4**
Unit 3	Innovation, types of innovation, creative problem solving, incubators, angel investors, venture capital	**CLO1, CLO2 CLO3, CLO4**
Unit 4	Intellectual Property Rights – copyright, patents, trademarks, design and registration procedures	**CLO1, CLO2, CLO3, CLO4**
Unit 5	Project identification and classification, project formulation, project appraisal, project report presentation	**CLO1, CLO2, CLO3, CLO4, CLO5, CLO6**

Alignment of CLO with PLO
3 = High, 2 = Medium, 1 = Low, – = Not Applicable

CLOs/ PLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	2	1	1	1	1	1	1	1	1	1
CLO2	2	1	1	1	1	1	1	2	1	1
CLO3	2	2	2	1	1	1	2	1	1	1
CLO4	2	1	2	1	1	1	1	3	1	1
CLO5	2	1	2	1	2	1	1	1	1	1
CLO6	2	2	2	2	2	2	2	1	2	2

INTRODUCTION TO ENTREPRENEURSHIP - NME26ES (30 HRS)

Unit 1 **(6 hrs)**

Entrepreneurship-Introduction-Factors-Barriers-Entrepreneurial Traits and Types- Steps for starting a Small Industry- MSMEs – Social entrepreneurship.

Unit 2 **(6 hrs)**

Entrepreneurship Development Programmes-Institutional Framework (IFCI, ICICI, IDBI, IRBI, EXIM Bank, NSIC, SIDBI, SFC, SIPCOT AND TIIC) - Role of Incentives and Subsidies

Unit 3 **(6 hrs)**

Innovation - Types –Role- Creative Problem Solving -Incubators - Angel Investors - Venture Capital.

Unit 4 **(6 hrs)**

Intellectual Property- Meaning- Copy Right Registration- Patents- Trademark- Design and Procedure for registration.

Unit 5 **(6 hrs)**

Project Preparation

Project identification and Classification - Project Formulation- Project Appraisal- Project Report Presentation.

Text Books

Sl. No.	Author(s)	Title of the Book	Publisher	Year of Publication & Edition
1.	Gupta. C.B and Srinivasan. N. P	Entrepreneurial Development	Sultan Chand and Sons	2020
2	Sauhari Vinnie and Bhushan Sudhashu	Innovation Management	Oxford	2014

Reference Books

Sl. No.	Author(s)	Title of the Book	Publisher	Year of Publication & Edition
1.	Kolb Bonita M	Entrepreneurship for the creative and cultural industries	Routedge	2015
2.	P. T. Vijayashree & M. Alagammai	Entrepreneurship and Small Business Management	Margham	2020