



BACHELOR OF COMPUTER APPLICATIONS

PROGRAMME CODE: AP

**CHOICE BASED CREDIT SYSTEM (CBCS) &
LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK (LOCF)**

SCHEME OF EXAMINATION & SYLLABUS

(w.e.f 2026 - 27 onwards)

REGULATIONS 2026

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 BCA

Vision

- To empower women with innovative computing knowledge, programming expertise, analytical thinking, and digital leadership to transform ideas into technology by designing intelligent software solutions, adapting to emerging technologies, and solving real-world problems with creativity, ethical values, and responsibility in the global digital society.

Mission

- To build strong foundations in computing principles, programming, and emerging technologies, enabling students to develop practical skills and competence in applying technology to real-world problems.
- To develop analytical thinking, problem-solving ability, and creativity among women students for designing intelligent and impactful software solutions.
- To encourage research, innovation, and industry collaboration that enables students to adapt to rapidly evolving digital technologies.
- To nurture ethical values, leadership qualities, and social responsibility so that graduates contribute positively to the global digital society.

Bachelor of Computer Applications

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)

PEO1: Graduates will establish successful careers in the computing and digital technology sectors by applying analytical thinking, innovation, and professional competencies to develop impactful technological solutions.

PEO2: Graduates will pursue higher education, research, and continuous professional development to adapt to emerging technologies and evolving global digital environments through lifelong learning.

PEO3: Graduates will demonstrate ethical conduct, inclusiveness, and social responsibility while applying computing knowledge to promote equity, digital empowerment, and environmentally sustainable practices in society.

PEO4: Graduates will contribute effectively to organizations and communities by exhibiting leadership, teamwork, and responsible decision-making in addressing real-world technological and societal challenges.

PEO5: Graduates will demonstrate entrepreneurial mindset and innovation to create technology-driven opportunities and solutions that support sustainable development and societal advancement.

Programme Learning Outcomes (PLOs)

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

PLO1: Apply core computing concepts, programming principles, and system knowledge to develop functional software solutions for real-world applications.

PLO2: Analyze computing problems using logical and analytical reasoning to identify requirements and formulate efficient technological solutions.

PLO3: Design and implement software applications using appropriate programming paradigms, development tools, and modern computing frameworks.

PLO4: Evaluate algorithms, data structures, and computing systems to enhance the efficiency, reliability, and scalability of software solutions.

PLO5: Conduct basic research by collecting, analyzing, and interpreting computing-related data to address technological challenges.

PLO6: Communicate technical concepts, system designs, and project outcomes effectively through written, oral, and digital formats.

PLO7: Collaborate effectively in multidisciplinary teams to plan, develop, and deliver computing solutions in professional environments.

PLO8: Demonstrate ethical reasoning and social responsibility while applying computing technologies in diverse societal contexts.

PLO9: Utilize digital tools, computational platforms, and information resources responsibly for data analysis and technology-driven innovation.

PLO10: Demonstrate reflective thinking, self-directed learning, and adaptability to emerging technologies for continuous professional growth and lifelong learning.

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 core computing concepts, programming principles, and system knowledge to develop functional software solutions for real-world applications.	K3	CIA, ESE, Practical	GA1, GA4
PLO2	Analyze computing problems using logical and analytical reasoning to identify requirements and propose efficient technological solutions.	K4	CIA, Case Study, ESE	GA3, GA5
PLO3	Design and implement software applications using appropriate programming paradigms, development tools, and modern computing frameworks.	K6	Practical, Project, Viva	GA4, GA10
PLO4	Evaluate algorithms, data structures, and computing systems to improve efficiency, reliability, and scalability of software solutions.	K5	CIA, ESE, Practical	GA5, GA8
PLO5	Conduct basic research activities by collecting, analyzing, and interpreting computing-related data to address technological problems.	K4	Project, Seminar, Viva	GA6, GA10
PLO6	Communicate computing concepts, technical designs, and project outcomes effectively through written documentation, presentations, and digital media.	K3	Seminar, Viva, Project	GA2
PLO7	Collaborate effectively in multidisciplinary teams to plan, develop, and deliver computing solutions in professional and academic environments.	K3	Project, Internship, Viva	GA7, GA14
PLO8	Demonstrate ethical reasoning, inclusiveness, and social responsibility while applying computing technologies in diverse societal contexts.	K3	Case Study, Field Work, Seminar	GA13, GA12
PLO9	Utilize digital platforms, computational tools, and information resources	K5	Practical, CIA,	GA10, GA1

	responsibly for data analysis, innovation, and technology-enabled solutions.		Project	
PLO10	Demonstrate reflective thinking, self-directed learning, and adaptability to emerging technologies for sustained professional growth.	K4	Internship, Seminar, Project	GA9, GA11, GA15

Programme Specific Outcomes (PSOs)

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

PSO1:Develop structured software programs using procedural and object-oriented programming techniques to solve computational problems.

PSO2: Design and manage data-driven applications by implementing database systems, data mining techniques, and efficient data handling methods.

PSO3:Build interactive web and enterprise applications using modern development frameworks, interface design principles, and application deployment techniques.

PSO4:Analyze and configure computing infrastructures including operating systems, computer networks, and cloud platforms for efficient system operation.

PSO5:Develop intelligent and technology-driven solutions by applying concepts from artificial intelligence, machine learning, blockchain, and Internet of Things.

PSO6:Implement industry-oriented software solutions through project planning, graphics processing, image analysis, and professional project execution.

PSO Alignment with Core Courses and Skill Competencies

PSO No	Programme Specific Outcome	Supporting Core Courses	Skill Competency
PSO1	Develop structured software programs using procedural and object-oriented programming techniques to solve computational problems.	Problem Solving Techniques in C, Python Programming, Data Structures using Python, Java Programming	Programming and Algorithmic Development
PSO2	Design and manage data-driven applications by implementing database systems, data mining techniques, and efficient data handling methods.	Database Management System Lab, Data Mining, Machine Learning	Data Management and Analytical Computing
PSO3	Build interactive web and enterprise applications using modern development frameworks, interface design principles, and application deployment techniques.	Web Technology, UI/UX Design, .NET Programming, Enterprise Resource Planning	Full Stack and Enterprise Application Development
PSO4	Analyze and configure computing infrastructures including operating systems, computer networks, and cloud platforms for efficient system operation.	Operating System, Computer Networks, Cloud Computing, Mobile Edge Computing	System Administration and Distributed Computing
PSO5	Develop intelligent and technology-driven solutions by applying concepts from artificial intelligence, machine learning, blockchain, and Internet of Things.	Artificial Intelligence, Machine Learning, Internet of Things, Block Chain Technology	Intelligent Systems and Emerging Technologies
PSO6	Implement industry-oriented software solutions through project planning, graphics processing, image analysis, and professional project execution.	Software Project Management, Computer Graphics, Digital Image Processing, Project Viva Voce	Software Engineering and Applied Computing

SCHEME OF EXAMINATION

Sem	Part	Course Code	Course Title	Course Type	Hours/ Week	Credits	Examination			
							Duration in Hours	Maximum Marks		
								CA	ESE	TOT AL
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	CY26C01	Core I : Problem Solving Techniques in C	DSC	5	4	3	25	75	100
		AP26C02	Core II: Operating System	DSC	5	4	3	25	75	100
		AP26CP1	Core Practical I : Programming in C Lab	DSC	4	2	3	15 ^{\$\$}	35 ^{\$\$}	50
		TH26A03	Generic Elective I : Numerical and statistical Techniques	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
II	I	TAM2602A	Tamil Paper II	AEC	4	3	3	25	75	100
		HIN2602A	Hindi Paper II							
		FRE2602A	French Paper II							
	II	ENG2602A	English Paper II	AEC	4	3	3	25	75	100
	III	AP26C03	Core III: Python Programming	DSC	5	4	3	25	75	100
		AP26C04	Core IV: Digital Computer Fundamentals	DSC	4	3	3	25	75	100
		AP26CP2	Core Practical II: Python Programming Lab	DSC	5	3	3	15 ^{\$\$}	35 ^{\$\$}	50
		TH26A11	Generic Elective II : Discrete Mathematics	MDC	6	5	3	25	75	100
	IV	NME26B2	Basic Tamil II	AEC	2 [€]	Gr.		100*	-	100 [£]
		NME26A2	Advanced Tamil II							

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		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	23				650
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	AP26C05	Core V: Computer Networks	DSC	5	4	3	25	75	100
		AP26C06	Core VI: Data Structures Using Python	DSC	5	4	3	25	75	100
		AP26CP3	Core Practical III: DBMS Lab	DSC	5	3	3	15 ^{\$\$}	35 ^{\$\$}	50
		TH26A20	Generic Elective III : Optimization Techniques	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	24				750
IV	I	TAM2604A	Tamil Paper IV	AEC	4	3	3	25	75	100
		HIN2604A	Hindi Paper IV							
		FRE2604A	French Paper IV							
	II	ENG2604A	English Paper IV	AEC	4	3	3	25	75	100
	III	AP26C07	Core VII: Data Mining Techniques	DSC	4	3	3	25	75	100
		AP26C08	Core VIII: Java Programming	DSC	5	4	3	25	75	100
		AP26CP4	Core Practical IV: Java Programming Lab	DSC	4	2	3	15 ^{\$\$}	35 ^{\$\$}	50
		AP26A01	Generic Elective IV : Digital Marketing (OR)	MDC	4	3	3	25	75	100
		CS26A02	Generic Elective IV : M-Commerce (OR)							

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		BP26A05	Generic Elective IV : Business Accounting							
	IV	AP26SECE	Excel Skills for Data Analytics and Visualization Specialization	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	24				850
V	III	IN26C09	Core IX : Machine Learning	DSC	5	4	3	25	75	100
		AP26C10	Core X : UI/UX Design	DSC	5	4	3	25	75	100
		AP26C11	Core XI : Software Project Management	DSC	5	4	3	25	75	100
		AP26CP5	Core Practical V : .Net Programming Lab	DSC	5	3	3	15 ^{\$\$}	35 ^{\$\$}	50
		AP26E01	Elective I : Computer Graphics (OR)	DSE	5	4	3	25	75	100
		AP26E02	Elective I : Perl Programming							
		AP26AC1	Advance Learner Course I : Enterprise Resource Planning (OR)	ACC	SS	5 [^]	3	25	75	100 [^]
		AP26AC2	Advance Learner Course I : Mobile Edge Computing							
	IV	AP26SEP1	Data Analytics – R Programming Lab	SEC	3	3	-	100*	-	100
		NM26CS1	Cyber Security I	VAC	2	Gr.	-	100*	-	100 [£]
		AP26INST	Field work/ Institutional Training (21 Days)	VAC	-	2	-	100*	-	100
	VI	AP26COM	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	24				650
VI	III	AP26C12	Core XII : Cloud Computing	DSC	5	4	3	25	75	100
		AP26C13	Core XIII : Artificial Intelligence	DSC	5	3	3	25	75	100
		AP26CP3	Core Practical VI : Full Stack Development Programming Lab	DSC	5	3	3	15 ^{\$\$}	35 ^{\$\$}	50

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		AP26E03	Elective II : Digital Image Processing (OR)	DSE	5	4	3	25	75	100
		AP26E04	Elective II : Blockchain Technology							
	IV	AP26SEP2	Data Analytics - Data Visualization Tools Practical	SEC	3	3	-	100*	-	100
	III	AP26PROJ	Project and Viva-voce	DSE	7	5	3	25	75	100
	III	AP26AC3	Advance Learner Course II : Responsible Artificial Intelligence (OR)	ACC	SS	5^	3	25	75	100^
		AP26AC4	Advance Learner Course II : Internet of Things							
Semester VI Total					30	22				550
I - VI	Total					140 + Additional Credits				4100 + Marks for Additional Credit Courses

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

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
SS	Self-Study

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

Undergraduate Programmes

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					
		K1	K2	K3	K4	K5	K6
<i>Questions from each unit comprising of</i>							
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					
		K1	K2	K3	K4	K5	K6
<i>Questions from each unit comprising of</i>							
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					
		K1	K2	K3	K4	K5	K6
<i>Questions from each unit comprising of</i>							
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	
CY26C01	Core I: Problem Solving Techniques in C	75	70	5	4

Preamble

- Introduces fundamental problem-solving approaches and programming concepts using the C language.
- It emphasizes algorithmic thinking, logical reasoning, and structured programming techniques required for developing efficient programs.
- Students learn to translate computational problems into algorithms, flowcharts, and C programs using variables, control structures, arrays, functions, pointers, and file handling mechanisms.
- The course also develops analytical abilities required for debugging and optimizing programs. It provides a strong foundation for advanced programming and cyber security–related computing applications.

Prerequisite

Students should possess basic knowledge of computer fundamentals, logical reasoning, and elementary mathematical concepts to understand problem-solving approaches and programming logic.

Course Learning Outcomes (CLOs)

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

CLO No	Course Learning Outcome	Bloom's Level
CLO1	Recall fundamental concepts of problem solving, including algorithms, flowcharts, and basic C constructs such as arrays, functions, pointers, and file handling.	K1
CLO2	Explain key programming concepts in C, including data types, operators, control structures, arrays, pointers and structures and demonstrate problem solving using algorithms and flowcharts.	K2
CLO3	Apply structured programming techniques to develop C programs using control statements, arrays, functions, pointers and file handling mechanism.	K3

CLO4	Analyze problems and design suitable algorithms and modular programs using functions, structures, pointers, and file handling operations.	K4
CLO5	Evaluate and optimize programming solutions using Arrays, functions, pointers, structures, and dynamic memory management techniques.	K5
CLO6	Develop complete C-based applications for real-world problems using modular design, file operations, and dynamic memory allocation.	K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

Unit-wise CLO Mapping

Unit	Coverage	Mapped CLOs
Unit I	Problem solving concepts, algorithms, flowcharts, pseudo code	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit II	C basics, data types, operators, input/output, decision and looping	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit III	Arrays, multidimensional arrays, strings, string functions	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit IV	Functions, recursion, structures and unions	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit V	Pointers, dynamic memory allocation, file 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	PLO 10
CLO1	2	1	1	1	1	1	1	1	1	1
CLO2	3	2	1	1	1	1	1	1	1	1
CLO3	3	1	2	1	1	1	1	1	1	1
CLO4	1	3	2	1	1	1	1	1	1	1
CLO5	1	1	1	3	1	1	1	1	2	1
CLO6	1	1	3	1	2	1	1	1	1	1

Core I: PROBLEM SOLVING TECHNIQUES IN C (CY26C01) (70 Hrs)**Unit I (14hrs)**

Introduction: Introduction to problem solving Concept – Steps for problem solving - Problem solving techniques — Algorithms – flowcharts – Types of Algorithms – Use flowcharts to represent algorithms – Pseudo code.

Unit II (14hrs)

Overview of C - Constants, Variables and Data types - Operators and Expressions - Managing Input and Output Operations - Sulba Sutras-Decision Making and Branching - Decision Making and Looping.

Unit III (14 hrs)

Shloka Arrays: One-Dimensional - Two Dimensional - Multidimensional Arrays-Character Arrays and Strings: Declaring and Initializing String Variables - Reading Strings from Terminal - Writing Strings to Screen - String Handling Functions.

Unit IV (14 hrs)

Chandas -User-Defined Functions: Need - Return Values and Types - Function Calls – Function declaration - Category of Functions - No Arguments and No Return Values - Arguments but No Return Values - Arguments with Return Values - Recursion - Scope Visibility and Life time of Variables Structures and Unions - Definition: Structure Initialization - Comparison of Structure Variables - Arrays of Structures - Arrays within Structures - Unions.

Unit V (14 hrs)

Pointers: Understanding Pointers - Accessing the Address of a Variable - Declaring and Initializing Pointers - Accessing a Variable through its Pointers - Pointers and Arrays. File Management in C: Defining and Opening a File - Closing File - I/O Operations on Files - Dynamic Memory allocation MALLOC, CALLOC, REALLOC.

*** Course Alignment with SDGs: 4****Text Books**

S.No.	Authors	Title	Publisher	Year & Edition
1	Yashwvant Kanetkar	Let Us C: Authentic Guide To C Programming Language	BPB Publications	2020, 17 th Edition

Reference Books

S.No.	Authors	Title	Publisher	Year & Edition
1	Byron Gottfried	Programming with C	Tata McGraw Hill	2018, 4 th Edition
2	E. Balagurusamy	Programming In ANSI C	Tata Mc Graw Hill	2019, 8 th Edition

Related Online References

1. Problem Solving techniques in C – studocu - <https://www.studocu.com/in/document/bengaluru-north-university/bca/problem-solving-techniques-using-c/16264070>

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	CY26C01, Core I: Problem Solving Techniques in C
Course Designers	Dr. G. Sophia Reena, Dr. K. Geethalakshmi, M. Selvanayagi
Teaching–Learning Strategies	Participatory Learning : 40.91 %
	Experiential Learning : 36.37 %
	Problem-based Learning : 22.72 %

Course Code	Course Title	Hours			Credits
		Total	Lecture	Examination	
AP26C02	Core II: Operating System	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 commands for administration, and perform file system operations in practical case studies.	K3
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
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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, CLO6
Unit II	CPU Scheduling Algorithms, Synchronization, Critical Section Problem, Semaphores, Deadlocks	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
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	2	3	1	1	1	1	1	1	1	1
CLO3	3	1	1	1	1	1	1	1	2	1
CLO4	1	3	1	2	1	1	1	1	1	1
CLO5	1	2	1	3	1	1	1	1	1	1
CLO6	2	1	3	1	1	1	1	1	2	1

Core II: OPERATING SYSTEM (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,	2018,10 th Edn
2	Christopher Negus	Linux Bible	Wiley Publishers,	2010,10 th Edn

Reference Books

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

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 System
Course Designers	Mrs.T.S.Anushya Devi, Dr. G. Dhivya
Teaching–Learning Strategies	Participatory Learning : 45 %
	Experiential Learning : 36 %
	Problem-based Learning : 19 %

Course Code	Course Title	Hours			Credits
		Total	Practical	Examination	
AP26CP1	Core Practical I : Programming in C Lab	60	57	3	2

Course Preamble

- Introduces fundamental programming practices through hands-on C laboratory exercises.
- Develops problem-solving skills using operators, control structures, arrays, strings, and functions.
- Provides practical experience in modular programming using structures and pointers.
- Enables implementation of file handling techniques for simple data processing tasks.

Prerequisite

Basic knowledge of computer fundamentals and familiarity with algorithms and flowcharts.

Course Learning Outcomes (CLOs)

CLO No	Course Learning Outcome	Bloom's Level
CLO1	Identify the syntax, data types, operators, and fundamental constructs of the C programming language.	K1
CLO2	Explain the working principles of control structures, arrays, strings, functions, recursion, pointers, and union concepts used in C programs.	K2
CLO3	Apply C programming constructs to develop programs using operators, arrays, functions, recursion, structures, and union concepts.	K3
CLO4	Analyse program logic and identify errors while implementing C programs involving pointers, strings, recursion, union, and file handling.	K4
CLO5	Evaluate alternative programming approaches to improve the correctness and efficiency of C programs.	K5
CLO6	Design and implement structured C programs integrating functions, pointers, structures, and file operations to solve computational problems.	K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create
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Unit-wise CLO Mapping

Unit	Coverage	Mapped CLOs
Program 1	Using different operators	CLO1, CLO2, CLO3
Program 2	Control Structures	CLO1, CLO2, CLO3
Program 3	Arrays	CLO1, CLO2, CLO3
Program 4	String handling functions	CLO1, CLO2, CLO3, CLO4
Program 5	User defined functions	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Program 6	Structures	CLO1, CLO2, CLO3, CLO4, CLO4
Program 7	Pointers	CLO1, CLO2, CLO3, CLO4, CLO5
Program 8	Working with files	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Program 9	Recursion	CLO1, CLO2, CLO3, CLO4
Program 10	Union	CLO1, CLO2, CLO3, CLO4

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

Core Practical I : PROGRAMMING IN C LAB - AP26CP1 57 Hrs**List of Programs**

- Using different operators.
- Control Structures.
- Using arrays.
- String handling functions.
- User defined functions.
- Structures.
- Pointers.
- Working with files.
- Recursion
- Union

*** Course Alignment with SDGs: 9****Pedagogy**

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

- Demonstration of working environment / Tools / Software / Program

Course Designers & Teaching–Learning Strategies

Course Code & Title	AP26CP1, Core Practical I : PROGRAMMING IN C LAB
Course Designers	Mrs.T.S.Anushya Devi, Mrs. S. Mohana Priya
Teaching–Learning Strategies	Participatory Learning : 50 %
	Experiential Learning : 50 %

Course Code	Course Title	Hours			Credits
		Total	Lecture	Examination	
TH26A03	Generic Elective: Numerical and Statistical Techniques	90	85	5	5

Preamble

- This course introduces fundamental numerical and statistical techniques used for solving mathematical and real-life problems.
- It covers numerical methods for solving linear simultaneous equations, interpolation, differentiation and integration.
- The course also provides a foundation in statistical concepts such as correlation, regression and probability.
- In addition, students learn theoretical probability distributions including binomial, Poisson and normal distributions.
- The course develops analytical and computational skills required for quantitative analysis in various academic disciplines.

Prerequisite

Basic knowledge of elementary algebra, functions, and introductory statistics studied at the higher secondary level.

Course Learning Outcomes (CLOs)

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

CLO No	Course Learning Outcome	Bloom's Level
CLO1	Define the fundamental concepts of numerical methods, correlation, probability and theoretical distributions.	K1
CLO2	Explain the principles of interpolation, numerical differentiation, numerical integration and correlation techniques.	K2

CLO3	Apply numerical methods and statistical techniques to solve simple mathematical and statistical problems.	K3
CLO4	Analyze relationships between variables using correlation, regression and probability concepts.	K4
CLO5	Evaluate suitable numerical or statistical methods for solving given quantitative problems.	K5
CLO6	Develop simple models or solutions using numerical and statistical techniques for real-world situations.	K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

Unit-wise CLO Mapping

Unit	Coverage	Mapped CLOs
Unit I	Solution of linear simultaneous equations (Gauss elimination, Gauss Jordan, Gauss Seidel, Gauss Jacobi methods) and interpolation methods (Newton forward and backward).	CLO1, CLO2, CLO3, CLO4, CLO5
Unit II	Numerical differentiation, numerical integration (Newton–Cotes formulas, trapezoidal rule, Simpson’s rules) and Taylor series method.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit III	Skewness, correlation analysis, Karl Pearson’s coefficient, rank correlation, regression analysis.	CLO1, CLO2, CLO3, CLO4, CLO5
Unit IV	Probability concepts, probability calculation, theorems of probability and mathematical expectation.	CLO1, CLO2, CLO3, CLO4, CLO5
Unit V	Theoretical distributions: Binomial, Poisson and Normal distributions.	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	1	1	1	1	2	1	1	1	1	1
CLO2	1	2	1	1	2	1	1	1	1	1
CLO3	2	1	1	1	3	1	1	1	1	1
CLO4	1	3	1	1	2	1	1	1	1	1
CLO5	1	1	1	3	2	1	1	1	1	1
CLO6	1	1	3	1	2	1	1	1	1	1

Generic Elective: Numerical and Statistical Techniques (TH26A03) (85Hrs)**Unit I****(17 Hrs)**

Solution of Linear Simultaneous Equations: Gauss elimination - Gauss Jordan - Gauss Seidel and Gauss Jacobi methods -simple problems. Interpolation: Newton Forward and Backward Interpolation Formulae.

Unit II**(17 Hrs)**

Numerical Differentiation, Formulae for Derivatives: Newton's Forward Difference - Newton's Backward Difference, Numerical Integration: Introduction, Newton-Cotes Quadrature formulas: trapezoidal rule, Simpson's 1/3 and 3/8 rules, Taylor's series method.

Unit III**(17 Hrs)**

Skewness - Correlation analysis: Introduction - Significance of the study of correlation- correlation and causation - Types of correlation - Methods of studying correlation - Graphic method - Karl Pearson's coefficient of correlation - Coefficient of correlation and probable error - Coefficient of determination - Properties of the coefficient of the correlation - Rank correlation coefficient - Features of Spearman's correlation coefficient, Regression analysis.

Unit IV**(16 Hrs)**

Probability: Introduction - probability defined - Importance of the concept of probability - Calculation of probability - Theorems of probability (statements only) – Mathematical expectation-Simple problems.

Unit V**(18 Hrs)**

Theoretical Distributions: Binomial distribution - Poisson distribution and normal distribution (without derivations & proof).

Text Books

S.No.	Authors	Title	Publisher	Year & Edition
1	B.S. Grewal	Numerical Methods in Engineering and Science with Programs in C & C++	Khanna Publishers	2014 & 11 th edition
	Unit I: Chapter III & VII: 3.3, 3.4, 3.5 & 7.1-7.3 Unit II: Chapter VIII & X: 8.1, 8.2:(1,2),8.4, 8.5:(I, II, III),10.3			
2	S.P.Gupta	Statistical methods	Sultan Chand & Sons Publications	2005 & 43 rd Edition
	Unit III: Volume I: Chapter 9(till measures of skewness),10,11. (pg: 329-341, 377-412, 435-454) Unit IV: Volume-II Chapter 1(till Baye's theorem) (pg: 751-771) Unit V : Volume-II Chapter2 (pg:805-824, 826-834, 836-856)			

Reference Books

S.No.	Authors	Title	Publisher	Year & Edition
1	P.A.Navanitham	Business Mathematics And Statistics	Jai Publishing Company	2014
2	S.C Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons Publications	2001 & 10 th revised edition
3	P.Kandasamy, K.Thilagavathy and K.Gunavathy	Numerical Methods	S.Chand and company LTD	Reprint 2007
4	V.K.Kapoor	Fundamentals of Applied Statistics	Sultan Chand & Sons	2020 & 12 th revised edition

Related Online References

<https://nptel.ac.in/courses/111/107/111107105/>

(Lectures by Prof.Ameeya Kumar Nayak and Prof. Sanjeev Kumar,
Department of Mathematics, Indian Institution of Technology
Roorkee)Lecture 02 Gaussian elimination with partial pivoting Lecture 04
Jacobi and Gauss Seidel methods

Lecture 20 Newton's Forward Difference & Newton's Backward
Difference Lecture 34 Simpsons 1/3rd rule and 3/8 rule

<https://nptel.ac.in/courses/111/106/111106112/>

(6 Lectures by Prof.G.Srinivasan, Department of Management Studies, Indian
Institution of Technology Madras)

Lecture 12 Probability

Lecture 13 Rules of probability Lecture 19 Binomial distribution Lecture 20 Poisson distribution

Pedagogy

The course will be delivered using a combination of traditional and learner-centred 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	TH26A03, & Generic Elective :Numerical and Statistical Techniques
Course Designers	Dr.J.RejulaMercy , Dr.S.Deepa
Teaching–Learning Strategies	Participatory Learning : 31 %
	Experiential Learning : 26 %
	Problem-based Learning : 43 %

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

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

INTRODUCTION TO ENTREPRENEURSHIP - NME26ES (30 HRS)

Unit 1

(6hrs)

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

Unit 2

(6hrs)

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

Unit 3

(6hrs)

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

Unit 4

(6hrs)

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

Unit 5

(6hrs)

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.	KolbBonitaM	Entrepreneurship for the creative and cultural industries	Routledge	2015
2.	P.T.Vijayashree & M.Alagammai	Entrepreneurship and Small Business Management	Margham	2020