



B.Sc. COMPUTER SCIENCE WITH GRAPHICS AND CREATIVE DESIGN

PROGRAMME CODE: GC

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 Computer Science with Graphics and Creative Design

Vision

To empower women with strong foundations in computing and creative digital technologies through quality education in graphics, multimedia, and digital communication, enabling them to design innovative visual solutions, integrate technology with artistic expression, and contribute responsibly to the evolving digital media and creative industries.

Mission

- To provide a strong foundation in theoretical and practical aspects in computer science, graphics, and creative design through effective teaching and learning practices.
- To equip students with practical skills in digital visualization, multimedia tools, and modern computing applications.
- To develop analytical thinking and problem-solving abilities for building graphical and interactive systems.
- To encourage innovation, research orientation, and project-based learning in emerging computing fields.
- To cultivate ethical values, teamwork, and social responsibility, enabling students to contribute positively to society and the creative industry.

Department of Computer Science with Graphics and Creative Design

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 or pursue higher education in computer science, graphics, and creative digital technologies, applying interdisciplinary knowledge to develop innovative and effective visual communication solutions in the digital media industry.

PEO2: Graduates will demonstrate professional competence, creativity, and problem-solving abilities to design and implement responsible digital and graphical systems that address societal needs with ethical awareness and environmental sensitivity.

PEO3: Graduates will engage in lifelong learning, research, and skill enhancement to adapt to emerging technologies, creative tools, and evolving trends in computing, multimedia, and digital design.

PEO4: Graduates will exhibit leadership, teamwork, and entrepreneurial abilities in professional environments, contributing productively to organizations, startups, and collaborative creative industries.

PEO5: Graduates will uphold values of equity, inclusion, social responsibility, and dignity, using their knowledge and skills to empower communities and contribute to sustainable and equitable societal development.

Programme Learning Outcomes (PLOs)

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

PLO1: Apply fundamental concepts of computer science, graphics, and multimedia technologies to develop basic computational and visual design solutions.

PLO2: Analyze computing problems and graphical requirements to design appropriate algorithms, visual structures, and digital media solutions.

PLO3: Develop interactive multimedia applications, graphical systems, and creative digital designs using appropriate programming tools and multimedia technologies.

PLO4: Evaluate alternative design approaches and technological solutions for graphics and digital media applications considering efficiency, usability, and sustainability.

PLO5: Conduct basic research and project-based investigations in emerging computing and multimedia domains using appropriate research methodologies and digital resources.

PLO6: Communicate technical and creative ideas effectively through written reports, presentations, and visual demonstrations in professional and academic contexts.

PLO7: Collaborate effectively in multidisciplinary teams to design, develop, and present computing and creative digital media solutions.

PLO8: Demonstrate ethical responsibility and professional integrity while developing digital content and computing solutions for societal applications.

PLO9: Utilize modern digital tools, software platforms, and information resources to create innovative multimedia and graphical applications.

PLO10: Engage in reflective and self-directed learning to adapt to evolving technologies, creative practices, and professional opportunities in computing and digital media.

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 concepts of computer science, graphics, and multimedia technologies to develop basic computational and visual design solutions.	K3	CIA, ESE, Practical	GA1, GA10
PLO2	Analyze computing problems and graphical requirements to design appropriate algorithms, visual structures, and digital media solutions.	K4	CIA, ESE, Case Study, Practical	GA3, GA5
PLO3	Develop interactive multimedia applications, graphical systems, and creative digital designs using appropriate programming tools and multimedia technologies.	K3	Practical, Project, Viva	GA4, GA10
PLO4	Evaluate alternative design approaches and technological solutions for graphics and digital media applications considering efficiency, usability, and sustainability.	K5	Case Study, Project, Seminar	GA8, GA9
PLO5	Conduct basic research and project-based investigations in emerging computing and multimedia domains using appropriate research methodologies and digital resources.	K4	Project, Seminar, Viva	GA6, GA11
PLO6	Communicate technical and creative ideas effectively through written reports, presentations, and visual demonstrations in professional and academic contexts.	K3	Seminar, Viva, Project	GA2, GA12
PLO7	Collaborate effectively in multidisciplinary teams to design, develop, and present computing and creative digital media solutions.	K3	Project, Internship, Viva	GA7, GA14
PLO8	Demonstrate ethical responsibility and professional integrity while developing digital content and computing solutions for societal applications.	K3	Case Study, Field Work, Viva	GA13, GA12
PLO9	Utilize modern digital tools, software platforms, and information resources to create innovative multimedia and graphical applications.	K3	Practical, Project, Internship	GA10, GA11
PLO10	Engage in reflective and self-directed learning to adapt to evolving technologies, creative practices, and professional opportunities in computing and digital media.	K5	Internship, Seminar, Project	GA11, GA15

Programme Specific Outcomes (PSOs)

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

PSO1: Develop graphical and multimedia applications using programming concepts and computer graphics techniques for digital visualization and interactive media.

PSO2: Design and implement efficient computing solutions using algorithms, data structures, and database technologies for managing and processing digital information.

PSO3: Create professional digital illustrations, animations, and visual effects using modern 2D multimedia tools and animation techniques.

PSO4: Develop advanced 3D digital content including modelling, texturing, lighting, and rendering for multimedia and creative design applications.

PSO5: Build immersive and user-centered digital experiences by integrating AR/VR technologies and user interface design principles.

PSO Alignment with Core Courses and Skill Competencies

PSO No	Programme Specific Outcome	Supporting Core Courses	Skill Competency
PSO1	Develop graphical and multimedia applications using programming concepts and computer graphics techniques for digital visualization and interactive media.	Programming in C with Graphics, OOPs with Graphics, Graphics and Multimedia	Programming for Graphics, Visual Computing
PSO2	Design and implement efficient data management and computing solutions using algorithms, data structures, and database technologies.	Data Structure and Algorithm, Database Management System, .Net Programming	Algorithm Design, Data Management
PSO3	Create professional digital illustrations, animations, and visual effects using modern 2D multimedia tools and animation techniques.	2D Graphics and Illustration, 2D Animation and Visual Effects, 2D Animation and Visual Effects Lab	Digital Illustration, Animation Production
PSO4	Develop advanced 3D digital content including modelling, texturing, lighting, and rendering for multimedia and creative design applications.	3D Modelling and Texturing, 3D Modelling and Texturing Lab, Light and Rendering Lab	3D Content Creation, Rendering Techniques
PSO5	Build immersive and user-centered digital experiences by integrating AR/VR technologies and user interface design principles.	AR/VR, AR/VR Lab, UX/UI Design	Immersive Technology Development, User Experience Design

B.Sc. Computer Science with Graphics and Creative Design – Scheme and Syllabus,
2026 Regulations

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	GC26C01	Core I: Graphics and Multimedia	DSC	5	4	3	25	75	100
		GC26C02	Core II: Programming in C with Graphics	DSC	5	4	3	25	75	100
		GC26CP1	Core Practical I : Programming in C with Graphics Lab	DSC	4	2	3	15 ^{ss}	35 ^{ss}	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	GC26C03	Core III : OOPs with Graphics	DSC	5	4	3	25	75	100
		IN26C04	Core IV: Data Structures and Algorithms	DSC	4	3	3	25	75	100
		GC26CP2	Core Practical II : OOPs with Graphics Lab	DSC	5	3	3	15 ^{ss}	35 ^{ss}	50
		TH26A11	Generic Elective II: Discrete Mathematics	MDC	6	5	3	25	75	100
	IV	NME26B2	Basic Tamil II	AEC	2 ^e	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	IN26C05	Core V : Database Management System	DSC	5	4	3	25	75	100
		GC26C06	Core VI : 2D Graphics and Illustration	DSC	5	4	3	25	75	100
		GC26CP3	Core Practical III : 2D Graphics and Illustration Lab	DSC	5	3	3	15 ^{SS}	35 ^{SS}	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	GC26C07	Core VII : Operating Systems	DSC	4	3	3	25	75	100
		GC26C08	Core VIII: 2D Animation and Visual Effects	DSC	5	4	3	25	75	100
		GC26CP4	Core Practical IV: 2D Animation and Visual Effects Lab	DSC	4	2	2	15 ^{SS}	35 ^{SS}	50
		AP26A01	Generic Elective IV : Digital Marketing (OR)	MDC	4	3	3	25	75	100

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		CS26A02	Generic Elective IV : M-Commerce (OR)							
		BP26A05	Business Accounts							
		GC26SECE	Affinity Photo Editing Mastery 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	GC26C09	Core IX: .Net Programming	DSC	5	4	3	25	75	100
		GC26C10	Core X: 3D Modelling and Texturing	DSC	5	4	3	25	75	100
		GC26C11	Core XI : Software Engineering and Testing	DSC	5	4	3	25	75	100
		GC26CP5	Core Practical V : 3D Modelling and Texturing Lab	DSC	5	3	3	15 ^{SS}	35 ^{SS}	50
		GC26E01	Elective I : Computer Networks (OR)	DSE	5	4	3	25	75	100
		GC26E02	Elective I : Cloud Computing (OR)							
		GC26E03	Elective I: Machine Learning							
		IN26AC1	Advance Learner Course I : Data Mining (OR)	ACC	SS	5 [^]	3	25	75	100 [^]
		IN26AC2	Advance Learner Course I : Bio-Inspired Computing							
	IV	GC26SEP1	Adobe After Fx lab	SEC	3	3	-	100*	-	100
		NM26CS1	Cyber Security I	VAC	2	Gr.	-	100*	-	100 [£]
		GC26INST	Field work/ Institutional Training (21 Days)	VAC	-	2	-	100*	-	100
	VI	GC26COM	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

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VI	III	GC26C12	Core XII : Augmented Reality and Virtual Reality	DSC	5	4	3	25	75	100
		GC26C13	Core XIII : UX/UI Design	DSC	5	3	3	25	75	100
		GC26CP6	Core Practical VI: Augmented Reality and Virtual Reality Lab	DSC	5	3	6	15 ^{SS}	35 ^{SS}	50
		GC26E04	Elective II : Web Technology (OR)	DSE	5	4	3	25	75	100
		GC26E05	Elective II : 3DS MAX Animation							
	IV	GC26SEP2	Light and Rendering Lab	SEC	3	3	-	100*	-	100
		GC26PROJ	Project and Viva-voce	DSE	7	5	3	25	75	100
	III	IN26AC3	Advance Learner Course II : Robotic Process Automation (OR)	ACC	SS	5^	3	25	75	100^
		IN26AC4	Advance Learner Course II : Big Data Analytics							
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	
GC26C01	Core I: Graphics and Multimedia	75	70	5	4

Preamble

- Introduces the fundamental principles of computer graphics and multimedia used in digital content creation.
- Builds strong conceptual understanding of primitives, geometric transformations, and viewing techniques essential for visual computing.
- Explores multimedia elements such as text, images, audio, video, and animation along with their processing and compression methods.
- Enables students to understand how multimedia elements are processed and integrated to develop basic digital media applications.

Prerequisite

Basic knowledge of computer fundamentals and introductory programming concepts.

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 computer graphics and multimedia elements including text, image, audio, video, and animation.	K1
CLO2	Explain the principles of graphical primitives, geometric transformations, and multimedia components used in digital media systems.	K2
CLO3	Apply graphical algorithms, transformations, and multimedia processing concepts to represent and manipulate digital visual elements.	K3
CLO4	Analyze multimedia components such as images, audio, and video in terms of formats, processing methods, and system requirements.	K4
CLO5	Evaluate different multimedia technologies, compression techniques, and rendering approaches based on efficiency and usability.	K5

CLO6	Design simple multimedia presentations or visual representations by integrating graphics, text, audio, and animation elements.	K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

Unit-wise CLO Mapping

Unit	Coverage	Mapped CLOs
Unit I	Graphics primitives, drawing algorithms, attributes	CLO1,CLO2, CLO3, CLO4, CLO5, CLO6
Unit II	2D transformations, viewing pipeline, clipping	CLO1,CLO2, CLO3, CLO4, CLO5, CLO6
Unit III	Text and image concepts, color models, image processing	CLO1,CLO2, CLO3, CLO4, CLO5, CLO6
Unit IV	Audio fundamentals, audio processing, audio formats	CLO1,CLO2, CLO3, CLO4, CLO5, CLO6
Unit V	Video systems, animation techniques, multimedia compression	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	2	1
CLO2	3	2	1	1	1	1	1	1	2	1
CLO3	3	2	2	1	1	1	1	1	2	1
CLO4	2	3	1	2	1	1	1	1	2	1
CLO5	1	2	1	3	1	1	1	1	2	1
CLO6	2	1	3	2	1	2	1	1	2	1

Core I: Graphics and Multimedia (GC26C01) (70 Hrs)

Unit I (14 Hrs)

Output Primitives: Points and Lines – Line - Drawing algorithms – Loading frame Buffer – Line function – Circle - Generating algorithms – Ellipse - generating algorithms. Attributes of Output Primitives: Line Attributes – Curve attributes – Color and Grayscale Levels – Area- fill attributes – Character Attributes.

Unit II (14 Hrs)

2D Geometric Transformations: Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations. 2D Viewing: The Viewing Pipeline – Viewing Coordinate Reference Frame – Window-to-Viewport Co-ordinate Transformation - 2D Viewing Functions – Clipping Operations.

Unit III (14 Hrs)

Text: Types of Text – Unicode Standard – Font – Insertion of Text – Text compression – File formats. Image: Image Types – Seeing Color – Color Models – Basic Steps for Image Processing – Scanner – Digital Camera – Interface Standards – Specification of Digital Images – CMS – Device Independent Color Models – Image Processing software – File Formats – Image Output on Monitor and Printer.

Unit IV (14 Hrs)

Audio: Introduction – Acoustics – Nature of Sound Waves – Fundamental Characteristics of Sound – Microphone – Amplifier – Loudspeaker – Audio Mixer – Digital Audio – Synthesizers – MIDI – Basics of Staff Notation – Sound Card – Audio Transmission – Audio File formats and CODECs – Audio Recording Systems – Audio and Multimedia – Voice Recognition and Response - Audio Processing Software.

Unit V (14 Hrs)

Video: Analog Video Camera – Transmission of Video Signals – Video Signal Formats – Television Broadcasting Standards – PC Video – Video File Formats and CODECs – Video Editing – Video Editing Software. Animation: Types of Animation – Computer Assisted Animation – Creating Movement – Principles of Animation – Some Techniques of Animation – Animation on the Web – Special Effects – Rendering Algorithms. Compression: MPEG-1 Audio – MPEG-1 Video - MPEG-2Audio – MPEG-2 Video.

*** Course Alignment with SDGs: 4**

Text Books

S.No.	Authors	Title	Publisher	Year & Edition
1	M.Pauline Baker	Computer Graphics (Unit- I & II)	PHI	2014, 4 th Edn
2	Ranjan Parekh	Principles of Multimedia (Unit-III, IV & V)	CRC Press	2025, 3 rd Edn

Reference Books

S.No.	Authors	Title	Publisher	Year & Edition
1.	Amarendra N Sinha, Arun D	Computer Graphics	McGraw Hill	2007, 2 nd Edn.
2.	Tay Vaughan	Multimedia: Making it Work	McGraw Hill	2014, 9 th Edn.

Related Online References

1. <https://nptel.ac.in/courses/106106090>
2. <https://ocw.mit.edu/courses/6-815-digital-and-computational-photography/>

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

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Unit – 1 (14 Hrs)						
Module No.	Topic	CLO Level	K Level	No. of Hours	Content Delivery Methods	Learning Methods
1	Output Primitives: Points and Lines	CLO1, CLO2	K1, K2	1	Lecture / Brainstorming	Participatory Learning
2	Line - Drawing algorithms	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	Chalk and Talk / PPT	Participatory Learning
3	Loading frame Buffer – Line function	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Lecture / PPT	Problem- based Learning
4	Circle - Generating algorithms	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT	Problem- based Learning
5	Ellipse - generating algorithms.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Group Discussion / Lecture	Problem- based Learning
6	Attributes of Output Primitives: Line Attributes – Curve attributes	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Seminar / Quiz	Participatory Learning
7	Color and Grayscale Levels	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	PPT/Illustrations	Problem- based Learning
8	Area- fill attributes Character Attributes.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Demo/Role Play	Participatory Learning
Unit – 2 (14 Hrs)						
9	2D Geometric Transformations	CLO1	K1	1	Discussion / Lecture	Problem- based Learning
10	Basic Transformations Matrix Representations	CLO2, CLO3, CLO4	K2, K3, K4	2	Lecture / PPT	Problem- based Learning
11	Composite Transformations	CLO1, CLO2,	K1, K2,	2	Lecture / PPT	Problem- based Learning

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	Other Transformations.	CLO3, CLO4, CLO5, CLO6	K3, K4, K5, K6			
12	2D Viewing: The Viewing Pipeline	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Chalk and talk / Seminar / PPT	Problem- based Learning
13	Viewing Coordinate Reference	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	1	Lecture / PPT	Problem- based Learning
14	Window-to-Viewport Co-ordinate Transformation	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Lecture / PPT	Problem- based Learning
15	2D Viewing Functions	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	PPT/Illustrations	Problem- based Learning
16	Clipping Operations.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Problem- based Learning
Unit – 3 (14 Hrs)						
17	Text: Types of Text	CLO1, CLO2, CLO3	K1, K2, K3	1	Flipped classroom / One - Minute Presentation	Participatory Learning
18	Unicode Standard – Font – Insertion of Text	CLO1, CLO2, CLO3	K1, K2, K3	1	Brainstorming	Problem-based Learning
19	Text compression – File formats	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	2	Chalk and talk / Seminar / PPT	Problem Based Learning
20	Image: Image Types. Seeing Color – Color Models	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	2	Brainstorming	Problem-based Learning
21	Basic Steps for Image Processing – Scanner – Digital Camera –	CLO1, CLO2, CLO3	K1, K2, K3	2	Lecture / PPT	Participatory Learning
22	Interface Standards –	CLO1, CLO2,	K1, K2,	2	PPT/Illustrations	Participatory Learning

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	Specification of Digital Images	CLO3, CLO4, CLO5, CLO6	K3, K4, K5, K6			
23	CMS – Device Independent Color Models	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Problem- based Learning
24	Image Processing software – File Formats – Image Output on Monitor and Printer.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Experiential Learning
Unit – 4 (14 Hrs)						
25	Audio: Introduction – Acoustics	CLO1, CLO2, CLO3	K1, K2, K3	1	Lecture / Brainstorming	Participatory Learning
26	Nature of Sound Waves – Fundamental Characteristics of Sound	CLO1, CLO2, CLO3	K1, K2, K3	1	Chalk and Talk / PPT	Problem- based Learning
27	Microphone – Amplifier	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	1	Lecture / PPT	Experiential Learning
28	Loudspeaker – Audio Mixer	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	1	Lecture / PPT	Experiential Learning
29	Digital Audio – Synthesizers	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	2	Lecture / PPT	Problem- based Learning
30	MIDI – Basics of Staff Notation Sound Card – Audio Transmission	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	2	Lecture / PPT	Problem- based Learning
31	Audio File formats and CODECs	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	2	PPT/Illustrations	Experiential Learning

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		CLO6	K6			
32	Audio Recording Systems – Audio and Multimedia	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Experiential Learning
33	Voice Recognition and Response - Audio Processing Software.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	PPT/Illustrations	Experiential Learning
Unit – 5 (14 Hrs)						
34	Video: Analog Video Camera – Transmission of Video Signals	CLO1, CLO2, CLO3	K1, K2, K3	1	Lecture / PPT	Participatory Learning
35	Video Signal Formats – Television Broadcasting Standards – PC Video	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	1	Lecture / PPT	Participatory Learning
36	Video File Formats and CODECs	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	1	Lecture / PPT	Participatory Learning
37	Video Editing – Video Editing Software	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	1	Demonstration	Experiential Learning
38	Animation: Types of Animation	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	PPT/Illustrations	Participatory Learning
39	Computer Assisted Animation – Creating Movement	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Experiential Learning
40	Principles of Animation – Some Techniques of Animation	CLO1, CLO2, CLO3, CLO4,	K1, K2, K3, K4,	2	Demonstration	Participatory Learning

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		CLO5, CLO6	K5, K6			
41	Animation on the Web – Special Effects – Rendering Algorithms.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	PPT/Illustrations	Problem- based Learning
42	Compression: MPEG-1 Audio – MPEG-1 Video - MPEG-2Audio – MPEG-2 Video.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Problem- based Learning

Course Designers & Teaching–Learning Strategies

Course Code & Title	GC26C01, Core I: Graphics and Multimedia
Course Designers	Dr. S. Devipriya
Teaching–Learning Strategies	Participatory Learning : 38 %
	Experiential Learning : 17 %
	Problem-based Learning : 45 %

Course Code	Course Title	Hours			Credits
		Total	Lecture	Examination	
GC26C02	Core II: Programming in C with Graphics	75	70	5	4

Preamble

- Introduces the fundamentals of C programming and its application in computer graphics.
- Emphasizes on developing problem-solving skills through structured programming constructs such as control structures, arrays, functions, pointers, and file handling.
- Explores graphical programming using C to create basic visual objects and animations.
- Enables students to gain practical knowledge of graphical algorithms, transformations, clipping techniques, and simple 3D concepts.
- The course forms a foundation for developing computational and graphical applications.

Prerequisite

Basic knowledge of computer fundamentals and logical problem solving.

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 elements of C programming including data types, operators, control structures, arrays, string types, functions, pointers, file operations and basic graphics functions.	K1
CLO2	Explain programming key concepts in C such as arrays, string types, functions, pointers, file operations, graphical algorithms, and transformation concepts used in graphics applications.	K2
CLO3	Apply structured programming techniques and graphics functions to develop programs using that generate basic graphical objects and visual outputs.	K3

CLO4	Analyze modular programs using functions, structures, pointers, file handling operations, graphical algorithms and transformation techniques to determine suitable approaches for graphical program implementation.	K4
CLO5	Design various line drawing, circle drawing, and clipping algorithms in graphical applications.	K5
CLO6	Develop simple graphical and animation-based programs using C graphics functions and transformation techniques.	K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

Unit-wise CLO Mapping

Unit	Coverage	Mapped CLOs
Unit I	C basics, control structures, graphics initialization	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit II	Arrays, strings, graphics drawing algorithms	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit III	Functions, transformations, animation concepts	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit IV	Pointers, file handling, clipping algorithms	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Unit V	3D graphics basics and projections	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	2	1
CLO2	3	2	1	1	1	1	1	1	2	1
CLO3	3	2	2	1	1	1	1	1	2	1
CLO4	2	3	1	2	1	1	1	1	1	1
CLO5	1	2	1	3	1	1	1	1	2	1
CLO6	2	1	3	2	1	1	1	1	2	1

Core II: Programming in C with Graphics (GC26C02) (70 hrs)

Unit I (14 Hrs)

Overview of C: Constants, Variables, Keywords, and Data Types. Structure of a C program, Compilation, and Execution. Operators and Expressions. Control Structures: Decision- making (if, switch), looping (for, while, do-while), and case control structures. Graphics Basics: Introduction to , initializing graphic modes, and basic graphics functions (line, circle, rectangle).

Unit II (14 Hrs)

Arrays: One-dimensional and multi-dimensional arrays. Strings: String handling functions (strlen, strcpy, strcmp). Reading and writing strings. Graphics Drawing: Algorithms for line drawing (DDA, Bresenham's line algorithm). Circle drawing algorithms (Midpoint, Bresenham's circle algorithm).

Unit III (14 Hrs)

Functions: Types, recursion, scope, and visibility. 2D Graphics: Basics of transformations – translation, scaling, reflection. Matrix representation and composite transformations. Animation: Introduction to basic animation concepts – frame-by-frame animation.

Unit IV (14 Hrs)

Pointers: Basics of pointers, pointer arithmetic, accessing variables through pointers. File Handling: File operations, random access, and command-line arguments. Clipping Techniques: Line clipping (Cohen-Sutherland Algorithm), polygon clipping (Sutherland-Hodgman Algorithm).

Unit V (14 Hrs)

3D Graphics: Basics of 3D transformations – translation, scaling, rotation. Projections: Orthographic and perspective projections.

*** Course Alignment with SDGs: 4**

Text Books

S.No.	Authors	Title	Publisher	Year & Edition
1	Balagurusamy	Programming in ANSI C	McGraw Hill	2024, 9 th Edn
2	David J.Eck	Introduction to Computer Graphics	OTL	2023, 1 st Edn

Reference Books

S.No.	Authors	Title	Publisher	Year & Edition
1.	Byron Gottfried	Programming with C	McGraw Hill	2018, 4 th Edn.
2.	Yashavant Kanetkar	Let Us C	BPB	2022, 19 th Edn.
3.	Donald Hearn & M. Pauline Baker	Computer Graphics: Principles and Practice	Pearson	2013, 9 th Edn.

Related Online References

1. https://onlinecourses.nptel.ac.in/noc19_cs06
2. <https://www.programmingsimplified.com/c-graphics-programming-tutorial>
3. <https://www.codewithc.in/tutorials/graphics>

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

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- Peer learning activities
- Student seminars

Unit – 1 (14 Hrs)						
Module No.	Topic	CLO Level	K Level	No. of Hours	Content Delivery Methods	Learning Methods
1	Overview of C: Constants, Variables, Keywords, and Data Types	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	1	Lecture / Brainstroming	Participatory Learning
2	Structure of a C program, Compilation, and Execution.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	1	Chalk and Talk / PPT	Participatory Learning
3	Operators and Expressions.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Lecture / PPT	Problem- based Learning
4	Control Structures: Decision- making (if, switch)	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Lecture / PPT	Problem- based Learning
5	Looping (for, while, do-while), and case control structures.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Group Discussion / Lecture	Experiential Learning
6	Graphics Basics: Introduction to <graphics.h>	CLO1, CLO2	K1, K2	2	Seminar / Quiz	Participatory Learning
7	Initializing graphic modes, and basic graphics functions	CLO1, CLO2, CLO3	K1, K2, K3	2	PPT/Illustrations	Experiential Learning
8	Basic graphics functions (line, circle, rectangle).	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Experiential Learning
Unit – 2 (14 Hrs)						
9	Arrays	CLO1, CLO2	K1, K2	1	Discussion / Lecture	Participatory Learning
10	One-dimensional and multi-	CLO1, CLO2, CLO3,	K1, K2, K3,	2	Lecture / PPT	Problem- based Learning

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	dimensional arrays.	CLO4	K4			
11	Strings: String handling functions (strlen, strcpy, strcmp)	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	2	Lecture / PPT	Problem- based Learning
12	Reading and writing strings	CLO1, CLO2, CLO3, CLO4, CLO5	K1, K2, K3, K4, K5	2	Chalk and talk / Seminar / PPT	Problem Based Learning
13	Graphics Drawing: Algorithms for line drawing	CLO1, CLO2, CLO3	K1, K2, K3	1	Lecture / PPT	Experiential Learning
14	DDA, Bresenham's line algorithm	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT	Experiential Learning
15	Circle drawing algorithms	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	PPT/Illustrations	Experiential Learning
16	Midpoint, Bresenham's circle algorithm	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Experiential Learning
Unit – 3 (14 Hrs)						
17	Functions: Types, recursion, scope	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Flipped classroom / One - Minute Presentation	Participatory Learning
18	2D Graphics: Basics of transformations	CLO1, CLO2, CLO3	K1, K2, K3	2	Brainstorming	Problem-based Learning
19	Translation, scaling, reflection	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Role-Play / Model Making	Problem- based Learning
20	Matrix representation and	CLO1, CLO2,	K1, K2,	2	Brainstorming	Problem-based Learning

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	composite transformations.	CLO3, CLO4, CLO5, CLO6	K3, K4, K5, K6			
21	Animation	CLO1, CLO2, CLO3	K1, K2, K3	2	Lecture / PPT	Experiential Learning
22	Introduction to basic animation concepts	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	PPT/Illustrations	Experiential Learning
23	Frame-by-frame animation.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Experiential Learning
Unit – 4 (14 Hrs)						
24	Pointers: Basics of pointers	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	1	Lecture / Brainstroming	Participatory Learning
25	Pointer arithmetic	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Chalk and Talk / PPT	Participatory Learning
26	Accessing variables through pointers.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Lecture / PPT	Problem- based Learning
27	File Handling: File operations	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Lecture / PPT	Problem- based Learning
28	Random access, and command-line arguments	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Lecture / PPT	Problem- based Learning
29	Clipping Techniques	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	1	PPT/Illustrations	Problem- based Learning
30	Line clipping (Cohen-Sutherland Algorithm),	CLO1, CLO2, CLO3, CLO4,	K1, K2, K3, K4,	2	Demo/Role Play	Experiential Learning

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		CLO5, CLO6	K5, K6			
31	Polygon clipping (Sutherland- Hodgman Algorithm).	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	PPT/Illustrations	Experiential Learning
Unit – 5 (14 Hrs)						
32	3D Graphics: Basics of 3D transformations	CLO1, CLO2, CLO3	K1, K2, K3	2	Lecture / PPT	Problem- based Learning
33	Translation	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Lecture / PPT	Problem- based Learning
34	Scaling,	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Lecture / PPT	Problem- based Learning
35	Rotation	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	2	Demonstration	Experiential Learning
36	Projections:	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	PPT/Illustrations	Experiential Learning
37	Orthographic projection	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Experiential Learning
38	Perspective projections.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	2	Demo/Role Play	Experiential Learning

Course Designers & Teaching–Learning Strategies

Course Code & Title	GC26C02, Core II: Programming in C with Graphics
Course Designers	Dr. P. Parvathi
Teaching–Learning Strategies	Participatory Learning : 20%
	Experiential Learning : 40 %
	Problem-based Learning : 40 %

Course Code	Course Title	Hours			Credits
		Total	Practical	Examination	
GC26CP1	Core Practical I : Programming in C with Graphics Lab	60	57	3	2

Preamble

- This practical course provides hands-on experience in implementing C programming concepts for computer graphics applications.
- It enables students to develop graphical programs using basic drawing functions and graphical algorithms.
- Emphasizes implementation of 2D transformations, clipping techniques, and simple animation using C graphics libraries.
- Students gain practical skills in program development, debugging, logical reasoning, creating and manipulating graphical objects.
- The laboratory activities strengthen computational thinking and visual programming abilities for graphics-based applications.

Prerequisite

Basic knowledge of C programming concepts and computer fundamentals.

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 basic graphics functions and programming constructs used for drawing graphical objects in C.	K1
CLO2	Explain the working principles of graphical algorithms and transformation techniques implemented in C graphics programs.	K2
CLO3	Apply C programs to draw basic shapes and perform graphical transformations using graphics library functions.	K3

CLO4	Analyze program logic and debug errors in C programs involving structures, pointers, and arrays.	K4
CLO5	Evaluate alternative programming approaches to improve the correctness and efficiency of C programs.	K5
CLO6	Develop structured C programs integrating functions, pointers, structures, and file operations to solve computational tasks.	K6

Unit-wise CLO Mapping

Unit	Coverage	Mapped CLOs
Program 1	Basic shapes (points, lines, circles, and rectangles) in C using graphics functions.	CLO1, CLO2, CLO3, CLO4
Program 2	Translation of a 2D object (like a line or shape) in the graphics window.	CLO1, CLO2, CLO3, CLO4
Program 3	Scaling of a 2D object.	CLO1, CLO2, CLO3, CLO4
Program 4	Rotation of a 2D object.	CLO1, CLO2, CLO3, CLO4
Program 5	Shearing transformations to 2D objects.	CLO1, CLO2, CLO3, CLO4
Program 6	Reflection transformations to 2D objects.	CLO1, CLO2, CLO3, CLO4
Program 7	Line drawing algorithms.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Program 8	Circle drawing algorithms.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Program 9	Line clipping algorithms for 2D objects.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6
Program 10	Animation techniques and user interaction with graphics.	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	2	1
CLO2	3	2	1	1	1	1	1	1	2	1
CLO3	3	2	3	1	1	1	1	1	2	1
CLO4	2	3	1	2	1	1	1	1	1	1
CLO5	1	2	1	3	1	1	1	1	2	1
CLO6	2	1	3	2	1	1	1	1	2	1

Core Practical I : Programming in C with Graphics Lab (GC26CP1) (57 hrs)

Program List

- Draw basic shapes (points, lines, circles, and rectangles) in C using graphics functions.
- Implement translation of a 2D object (like a line or shape) in the graphics window.
- Implement scaling and rotation of a 2D object.
- Apply shearing and reflection transformations to 2D objects.
- Implement and compare different line drawing algorithms.
- Implement and compare different circle drawing algorithms.
- Implement line clipping algorithms for 2D objects.
- Implement animation techniques and user interaction with graphics.

* Course Alignment with SDGs: 9

Pedagogy

- Demonstration of working environment/Tools/Software/Program

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Module No.	Topic	CLO Level	K Level	No. of Hours	Content Delivery Methods	Learning Methods
1	Basic shapes (points, lines) in C using graphics functions.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	5	Demo, Lab	Participatory Learning
2	Basic shapes (circles, and rectangles) in C using graphics functions.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	5	Demo, Lab	Participatory Learning
3	Translation of a 2D object (like a line or shape) in the graphics window.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	5	Demo, Lab	Participatory Learning
4	Scaling of a 2D object.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	5	Demo, Lab	Problem Based Learning
5	Rotation of a 2D object.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	5	Demo, Lab	Problem Based Learning
6	Shearing transformations to 2D objects.	CLO1, CLO2, CLO3, CLO4	K1, K2, K3, K4	5	Demo, Lab	Experiential Learning
7	Reflection transformations to 2D objects.	CLO1, CLO2,	K1, K2, K3,	5	Demo, Lab	Experiential Learning

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		CLO3, CLO4	K4			
8	Line drawing algorithms.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Demo, Lab	Experiential Learning
9	Circle drawing algorithms.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	6	Demo, Lab	Experiential Learning
10	Line clipping algorithms for 2D objects.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	5	Demo, Lab	Experiential Learning
11	Animation techniques and user interaction with graphics.	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6	K1, K2, K3, K4, K5, K6	6	Demo, Lab	Experiential Learning

Pedagogy

- Demonstration of working environment/Tools/Software/Program

Course Designers & Teaching–Learning Strategies

Course Code & Title	GC26CP1, Core Practical I: Programming in C with Graphics Lab
Course Designers	Dr. P. Parvathi
Teaching–Learning Strategies	Participatory Learning : 20 %
	Experiential Learning : 40 %
	Problem-based Learning : 40 %

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

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 Chapter 2 (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

Module No.	Topic	CLOs	K Level	No. of Hours	Content delivery methods	Learning Methods
UNIT – I (17 Hrs)						
1	Solution of Linear Simultaneous Equations Introduction	CLO1	K1	1	Lecture – Chalk and Talk/ Group readings	Problem-based Learning
2	Gauss elimination Method	CLO1 CLO2 CLO3	K1 K2 K3	2	Spotters / Lecture Discussion	Experiential Participatory Learning
3	Gauss Jordan Method	CLO1 CLO2 CLO3	K1 K2 K3	3	Lecture – Chalk and Talk ,OER,Spotters	Problem-based Learning, Participatory,

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						Experiential Learning
4	Gauss Seidel Method	CLO1 CLO3 CLO4	K1 K3 K4	3	Chalk and Talk ,Lecture , spotters	Experiential Learning, Participatory Learning
5	Gauss Jacobi method	CLO3 CLO4 CLO5	K3 K4 K5	2	Lecture – Chalk and Talk/Discussion	Participatory Learning ,Problem-based
6	Interpolation	CLO1 CLO2	K1 K2	1	OER	Participatory Learning
7	Newton Forward Interpolation Formulae	CLO2 CLO3 CLO4 CLO5	K2 K3 K4 K5	2	Lecture – Chalk and Talk/ Group readings	Problem-based Learning ,Participatory Learning
8	Newton Backward Interpolation Formulae	CLO2 CLO3 CLO4 CLO6	K2 K3 K4 K6	3	Lecture – Chalk and Talk , Spotters	Participatory Learning ,Problem based , Experiential Learning
UNIT – II (17 Hrs)						
9	Numerical Differentiation: Formulae for Derivatives	CLO1 CLO2	K1 K2	1	Lecture – Chalk and Talk/ Group readings	Problem-based Learning
10	Newton’s Forward Difference	CLO2 CLO3 CLO4	K2 K3 K4	2	Lecture – Chalk and Talk ,Spotters	Participatory Learning ,Experiential Learning

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11	Newton's Backward Difference	CLO2 CLO3 CLO4	K2 K3 K4	2	Lecture – Chalk and Talk ,PPT , OER	Participatory Learning
12	Numerical Integration Introduction	CLO1	K1	2	Lecture – Chalk and Talk	Participatory Learning , Problem-based Learning
13	Newton-Cotes Quadrature formulas	CLO1 CLO2	K1 K2	2	Lecture – Chalk and Talk ,Spotters	Problem-based Learning ,Experiential Learning
14	Trapezoidal rule	CLO2 CLO3 CLO4 CLO5	K2 K3 K4 K5	2	Lecture – Chalk and Talk/ Group readings ,OER	Problem-based ,Experiential Learning
15	Simpson's 1/3 rules	CLO2 CLO3 CLO4	K2 K3 K4	2	Lecture – Chalk and Talk ,Spotters , Seminar	Problem-based ,Experiential Learning
16	Simpson's 3/8 rule	CLO2 CLO3 CLO4	K2 K3 K4	2	Lecture / Seminar	Experiential ,Problem-based Learning
17	Taylor's series method	CLO2 CLO3 CLO4, CLO6	K2 K3 K4 K6	2	Lecture / OER	Experiential ,Problem-based Learning
UNIT – III (18 Hrs)						
18	Skewness	CLO1 CLO2 CLO4	K1 K2 K4	1	Lecture – Chalk and Talk	Participatory Learning

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19	Correlation analysis: Introduction	CLO2	K2	1	Lecture PPT	Participatory Learning
20	Significance of the study of correlation	CLO2	K2	1	Video / Observation	Experiential Learning
21	correlation and causation	CLO2	K2	1	Video / Observation	Experiential Learning
22	Types of correlation	CLO2 CLO3	K2 K3	1	Seminar / PPT	Participatory Learning
23	Methods of studying correlation	CLO2 CLO3	K2 K3	1	Lecture – Chalk and Talk	Problem-based Learning
24	Graphic method	CLO3 CLO4	K3 K4	2	Lecture – Chalk and Talk , Spotters	Participatory , Experiential Learning
25	Karl Pearson's coefficient of correlation	CLO3 CLO4	K3 K4	2	Lecture – Chalk and Talk , Group readings	Participatory , Problem-based Learning
26	Coefficient of correlation and probable error	CLO2 CLO3 CLO5	K2 K3 K5	1	Lecture PPT	Participatory Learning
27	Coefficient of determination	CLO2 CLO3	K2 K3	1	Demonstration	Experiential Learning
28	Properties of the coefficient of the correlation	CLO2	K2	1	Lecture – Chalk and Talk/ Group readings	Problem-based Learning
29	Rank correlation coefficient	CLO3 CLO4	K3 K4	1	Lecture – Chalk and Talk/ Group readings	Problem-based Learning

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30	Features of Spearman's correlation coefficient	CLO3 CLO4	K3 K4	2	Lecture – Chalk and Talk/ Group readings	Problem-based Learning
31	Regression Analysis	CLO2 CLO3 CLO4 CLO6	K2 K3 K4 K5	2	Lecture / Seminar ,PPT	Participatory ,Problem-based Learning
UNIT – IV (17 Hrs)						
32	Probability: Introduction, probability defined	CLO1 CLO2	K1 K2	3	Lecture – Chalk and Talk/ Group readings	Problem-based Learning
33	Importance of the concept of probability	CLO2	K2	1	Research article reading	Problem-based Learning
34	Calculation of probability	CLO2 CLO3	K2 K3	4	Lecture / Seminar ,Group readings , Demonstration	Participatory Learning, Problem-based , Experiential Learning
35	Theorems of probability (statements only)	CLO2 CLO3 CLO4 CLO5	K2 K3 K4 K5	7	Spotters / Lecture - Chalk and Talk ,Group readings ,PPT	Experiential Learning , Problem-based Learning , Participatory Learning
36	Mathematical expectation	CLO2 CLO3 CLO6	K2 K3 K6	2	Lecture – Chalk and Talk/ Group readings , PPT	Problem-based Learning
UNIT – V (19 Hrs)						

37	Theoretical Distributions Introduction	CLO1	K1	1	Lecture – Chalk and Talk/ Group readings	Problem-based Learning
38	Binomial distribution	CLO1 CLO2 CLO3 CLO4 CLO5	K1 K2 K3 K4 K5	5	Lecture /PPT , Demonstration ,Spotters	Participatory , Experiential Learning , Problem-based Learning
39	Poisson distribution	CLO1 CLO2 CLO3 CLO4	K1 K2 K3 K4	4	Discussion ,Demonstration ,Lecture – Chalk and Talk/ Group readings	Participatory Learning, Experiential , Problem-based Learning
40	Normal distribution	CLO1 CLO2 CLO3 CLO4 CLO6	K1 K2 K3 K4 K6	9	Research article reading ,Lecture – Chalk and Talk/ Group readings , Spotters ,Demonstration	Problem-based Learning , Experiential Learning

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