

M.Sc. (INFORMATION TECHNOLOGY)

Syllabus
(With effect from 2025-2026)

Program Code : CSEF



BHARATHIAR UNIVERSITY

DEPARTMENT OF INFORMATION TECHNOLOGY

Bharathiar University

**(A State University, Accredited with “A++” Grade by NAAC and
21st Rank among Indian Universities by MHRD-NIRF)**

Coimbatore 641 046, TAMILNADU, INDIA

BHARATHIAR UNIVERSITY, COIMBATORE – 641 046

DEPARTMENT OF INFORMATION TECHNOLOGY

MISSION

- **To mould the students as innovative and high quality IT professional to meet the global challenges.**
- **To provide value-based IT education to the students and enrich their knowledge.**
- **To engage the students in research and development to pursue higher education.**

**M. Sc. INFORMATION TECHNOLOGY (CBCS)
(Effective from the academic Year 2025 - 2026)**

1. Eligibility for Admission to the Programme

Candidates for admission to the First year programme leading to the Degree of Master of Science in Information Technology (M.Sc. IT) will be required to possess:

A Pass with 50% of marks in the

(i) Bachelor of Science (B.Sc.) in

- Information Technology
- Computer Technology
- Computer Science
- Computer Science & Computer Applications
- Computer Science & Data Analytics
- Computer Science & Cognitive Systems
- Artificial Intelligence & Machine Learning
- Artificial Intelligence & Data Analytics
- Artificial Intelligence & Data Science
- Data Science and Artificial Intelligence
- Artificial Intelligence
- Artificial Intelligence and Deep Learning
- Multimedia
- Multimedia and Web Technology
- Networking
- Networking and Information Technology
- Cyber Security
- Electronics
- Electronics and Communication Systems

(OR)

(ii) Bachelor of Computer Applications (B.C.A.)

(OR)

(iii) Above degree (B.Sc. & B.C.A. Programme with Honours) with Honours

In case of SC/ST candidates, a mere pass in any of the above said degree will be sufficient.

2. Duration of the Programme

The programme shall be offered on a full-time basis. The programme will consist of four semesters(2 years).

3. Regulations

The general Regulations of the Bharathiar University Choice Based Credit System Programme are applicable to this programme.

4. The Medium of Instruction and Examinations

The medium of instruction and Examinations shall be in English.

5. Submission of Record Notebooks for Practical Examinations & Project Viva-Voce.

Students taking the Practical Examinations should submit bonafide Record Note Books prescribed for the Examinations. Otherwise, the students will not be permitted to take the Practical Examinations.

Students taking the Project Viva Examination should submit Project Report prescribed for the Examinations. Otherwise the students will not be permitted to take the Project Viva-voce Examination.

6. Online Courses

Students have to complete one online course of 8 weeks to complete the M.Sc.(IT) programme from SWAYAM/NPTEL/BU-MOOCs.

7. Job Oriented Course/ Value Added Course

Students have to complete two Job Oriented courses and two Value Added courses apart from their regular curriculum.

8.Non Credit Courses

The following courses do not have credit, and there is no external examination, but an internal examination will be conducted for 50 marks, and the marks will be submitted to the Controller of Examinations. These marks will not be considered for CGPA calculations. So this mark will not reflect in the mark statement, but the course title will appear in the mark statement.

1. Skill Enhanced Courses
2. Professional Competency
3. Extension Activity
4. SWAYAM/MOOC courses

9. TANSCHÉ Scheme

The M.Sc.(IT) Programme adopted the TANSCHÉ scheme and syllabus with little modification.

Program Educational Objectives(PEOs)	
The M.Sc. Information Technology program describes that the graduated are expected to attain within two to five years after graduation	
PEO1	Be a Software Developer, he/she is an a team player in the Information Technology.
PEO2	Initiate life-long learning to acquire new technologies and development.
PEO3	Exhibit professional excellence, ethics, soft skills, leadership qualities as a responsible citizen.
PEO4	Graduate will be able to pursue higher studies in the field of Information Technology.
PEO5	Provide simplest automated solution to various legacy systems.
PEO6	Analyze, design and create innovative products for real time applications.
PEO7	Take up studies in the higher education institution in applied automated research.
PEO8	Acquire the skills need to become an entrepreneur in the Information Technology Domain.
PEO9	Able to get placed in Government / Public sectors to take care of Information Technology based solutions.
PEO10	Provide knowledge and skills to participate and be successful in choosing careers in the CIVIL services.

Program Specific Outcomes (PSOs)	
PSO1	Gaining through knowledge about the theoretical fundamentals in the Information Technology.
PSO2	Familiarity and practice modern computers programming languages.
PSO3	Gaining expertise in the design and development of Open source platform.
PSO4	Design, develop and test software systems for real world problems.
PSO5	Inculcate skills to excel in the field of Information Technology.
PSO6	Formalize and practice innovated ideas.

Program Outcomes (POs)	
On Successful completion of the M.Sc. (Information Technology) program	
PO1	Apply the knowledge of mathematics, science and computing in the core Information Technologies.
PO2	Create, select, and apply appropriate techniques in the field of Modern Information Technology.
PO3	Problem solving and programming ability to solve complex problems in the field of Information Technology.
PO4	Develop techniques for Capturing, Analysing, Processing and Storing the digital data.
PO5	Design and integrate Modern networks for fast and secure data transfer.
PO6	Create need based customized tools and software for Industrial Automations.
PO7	Enrich the skill set to meet professional expectations in the field of AI & ML, Multimedia, Image processing, Extended Reality.
PO8	Develop and implement solutions to real time problems using latest algorithms and techniques.
PO9	Provide Web and Mobile based solutions for automation.
PO10	To enrich research use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

BHARATHIAR UNIVERSITY: : COIMBATORE 641 046

M.Sc. (Information Technology) Curriculum (University Department)

(For the Students Admitted during the Academic Year 2025-26 Onwards)

Subject Code	Title of Course	Credits	Hours		Maximum Marks		
			Theory	Practical	CIA	ESE	Total
Semester – I							
	Theory						
25IT13A	Core I : Advanced Python Programming	4	62	-	25	75	100
25IT13B	Core II : Cryptography and Network Security	4	62	-	25	75	100
25IT13C	Core III : Modern Software Engineering	4	62	-	25	75	100
	Elective						
25IT1EX	Elective – I	3	47	-	25	75	100
25IT1EX	Elective – II	2	-	32	25	75	100
	Practical						
25IT13P	Core IV : Advanced Python Programming - Lab	2	-	32	25	75	100
25IT13Q	Core V : Cryptography and Network Security – Lab	2	-	32	25	75	100
25ITGSXX	Supportive Course - I	2	32	-	12	38	50
25IT1J1	Job Oriented Course - I	-	32	-	-	--	--
Total		23	297	96	187	563	750

Semester – II							
	Theory:						
25IT23A	Core VI : C# with .NET Programming	4	62	-	25	75	100
25IT23B	Core VII : WordPress Development	4	62	-	25	75	100
25IT23C	Core VIII : Open Source Technologies	4	62	-	25	75	100
	Elective:						
25IT2EX	Elective - III	3	47	-	25	75	100
25IT2EX	Elective - IV	2	-	32	25	75	100
	Practical :						
25IT23P	Core IX : C# with .NET Programming- Lab	2	-	32	25	75	100
25IT23Q	Core X : WordPress Development _Lab	2	-	32	25	75	100
25ITGSXX	Supportive Course - II	2	32	-	12	38	50
25IT2J2	Job Oriented Course - II	-	32	-	-	-	-
	Total	23	297	96	187	563	750

Semester – III							
	Theory :						
25IT33A	Core XI : Internet of Things	4	62	-	25	75	100
25IT33B	Core XII : Artificial Intelligence & Machine Learning	4	62	-	25	75	100
25IT33C	Core XIII : Research Methodology	4	62	-	25	75	100
	Elective:						
25IT3EX	Elective - V	3	47	-	25	75	100
25IT3EX	Elective - VI	2	-	32	25	75	100
	Practical :						
25IT33P	Core XIV : Internet of Things – Lab	2	-	32	25	75	100
25IT33Q	Core XV : Artificial Intelligence & Machine Learning – Lab	2	-	32	25	75	100
Mini Project							
25IT33R	Core XVI : Mini Project	3	32	-	25	75	100
25IT33S	Professional Competency	-	-	-	-	-	-
25IT33T	Extension Activity	-	-	-	-	-	-
25IT3V1	Value Added Course - I	-	32	-	-	-	-
Total		24	297	96	200	600	800

Semester – IV							
25IT43A	Core : XVII: Mobile Application Development	4	62	-	25	75	100
25IT43B	Core : XVIII : Modern JavaScript	4	62	-	25	75	100
	Practical :						
25IT43P	Core XIX : Mobile Application Development – Lab	2		32	25	75	100
25IT43Q	Core XX Modern JavaScript – Lab	2		32	25	75	100
	Main Project :						
25IT43R	Core XXI : Project Dissertation and Viva-Voce (Industry/ Internal Project)	12	-	-	150	150	300
25IT43S	SWAYAM/MOOC – Courses	-	-	-	-	-	-
25IT4V2	Value Added Course – II	-	32	-	-	-	-
Total		24	124	64	250	450	700
Grand Total		94	1081	352	824	2176	3000

List of Electives:

Students can Choose any one of the elective Courses from **Group A**, and should choose the relevant Practical course from **Group B** for the same semester.

Group A

Subject Code	Title of Course	Credits	Hours		Maximum Marks		
			Theory	Practical	CIA	ESE	Total
25ITXEA	Advanced Data Base Management Systems	3	47	-	25	75	100
25ITXEC	Graphics and Multimedia Systems	3	47	-	25	75	100
25ITXEE	Advanced Java Programming	3	47	-	25	75	100
25ITXEG	Extended Reality	3	47	-	25	75	100
25ITXEI	Industrial Automation and Robotics	3	47	-	25	75	100
25ITXEK	Data Science and Data Analytics	3	47	-	25	75	100
25ITXEM	Financial Technology	3	47	-	25	75	100
25ITXEO	BlockChain Technology	3	47	-	25	75	100
25ITXEQ	Edge Computing	3	47	-	25	75	100
25ITXES	Digital Marketing	3	47	-	25	75	100

Group B

Subject Code	Title of Course	Credits	Hours		Maximum Marks		
			Theory	Practical	CIA	ESE	Total
25ITXEB	Advanced Data Base Management Systems – Lab	2	-	32	25	75	100
25ITXED	Graphics and Multimedia Systems – Lab	2	-	32	25	75	100
25ITXEF	Advanced Java Programming – Lab	2	-	32	25	75	100

25ITXEH	Extended Reality – Lab	2	-	32	25	75	100
25ITXEJ	Robotics and Automation - Lab	2	-	32	25	75	100
25ITXEL	Data Science and Data Analytics – Lab	2	-	32	25	75	100
25ITXEN	Financial Technology – Lab	2	-	32	25	75	100
25ITXEP	BlockChain Technology – Lab	2	-	32	25	75	100
25ITXER	Edge Computing - Lab	2	-	32	25	75	100
25ITXET	Digital Marketing – Lab	2	-	32	25	75	100

Job-Oriented Courses:

Subject Code	Title of Course	Credits	Hours		Maximum Marks		
			Theory	practical	CIA	ESE	Total
25IT1J1	Animation Techniques	-	32	-	50	-	-
25IT1J2	Embedded systems and Wireless Sensor Networks for IoT	-	32	-	50	-	-

Value-Added Course:

Subject Code	Title of Course	Credits	Hours		Maximum Marks		
			Theory	practical	CIA	ESE	Total
25IT3V1	Ethical Hacking and Cyber Forensics	-	32	-	50	-	-
25IT4V2	UI/UX Design	-	32	-	50	-	-

Supportive Courses – Offered to other department students

Subject Code	Title of Course	Credits	Hours		Maximum Marks		
			Theory	practical	CIA	ESE	Total
25ITGS1	Industry 4.0	2	32	-	12	38	50
25ITGS2	Python Programming	2	32	-	12	38	50
25ITGS3	Introduction to Internet of Things	2	32	-	12	38	50
25ITGS4	Artificial Intelligence and Machine Learning	2	32	-	12	38	50
25ITGS5	Office Automation and ICT Tools	2	32	-	12	38	50

QUESTION PAPER PATTERN

Department of Information Technology : Bharathiar University

Question Paper Model with effect from 2025-26 onwards

Written Examination: Theory Paper (Bloom's Taxonomy-based)

Maximum 75 Marks;

Passing Minimum: 50%

Duration : Three Hours

Marks and Sections

Sections and Marks	Question Distributions	Intended Learning Skills
Part –A (10x 2 = 20 Marks) Answer ALL Questions Each question carries 2 marks	Two questions from each UNIT	Memory Recall / Example/ Counter Example / Knowledge about the Concepts/ Understanding
	Question 1 to Question 10	
Part – B (5 x 5 = 25 Marks) Answer ALL Questions Each question carries 5 Marks	Either-or Type Both questions are from the same UNIT	Descriptions/ Application (problems)
	Question 11(a) or 11(b) To Question 15(a) or 15(b)	
Part – C (3 x 10 = 30 Marks) Answer any THREE questions Each question carries 10 Marks	Each one question covering Each one unit	Analysis /Synthesis / Evaluation
	Question 16 to Question 20	

Course code	25IT13A	ADVANCED PYTHON PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core	3	1	-	4
Pre-requisite		Basic Python Programming	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. Understand the advanced Python Programming						
2. Get a Job in the IT industry as a python programmer						
3. Use Python programming in their research						
Expected Course Outcomes:						
1	Understand the basics of Python Programming					K2
2	Understand OOPs and Libraries on Python					K2
3	Design and Develop Python Programming					K3
4	Get a job in the IT industry as a Python Programmer					K6
5	Work as a freelance Python Programmer					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I		Functional Programming	12 HOURS			
List, Tuples, Sets and Dictionary - Closures and Decorators - Generators and Coroutines - Generator Expressions - Lambdas; File Handling and Regular Expressions : Working with text, CSV, JSON, and XML files - Reading and Writing Files and Directories - File Locking - Introduction to Regular Expressions (regex) - Pattern matching and string manipulations - Advanced regex techniques in Python						
UNIT:II		OOPS and DATABASE	12 HOURS			
Classes and Objects – Constructors and Destructors – Inheritance, Polymorphism, and Encapsulation - Static and Class Methods - Abstraction and Interfaces - Operator Overloading - Method Overriding - Assertion, Decorators, Generators, Iterators, and Factories - Descriptors and MetaClasses; Persistence and Databases : Shelve and Pickle – Connecting to Database(SQLite) – Sending DML and DLL queries and Processing the result from python						
UNIT:III		Web Programming	12 HOURS			
Introduction to Web Frameworks - JSON and XML - Using XML-RPC - Rest Interfaces - WSGI and HTML - Flask Framework - Controller Functions - Templates and Forms - Database ORMs - Template engines and Jinja2 - Handling HTTP requests and responses - Authentication and Authorization - Web scraping with BeautifulSoup and Scrapy – GUI building libraries – Widgets; Extending and Embedding Python : Calling C/C++ from Python - Using ctypes - Extension Modules in C/C++ - Raising Python Exceptions - Calling Python from C/C++ - Embedding Python Interpreter - Importing Python Modules from C/C++ - Converting Python Objects to C/C++ - Invoking Python Functions from C/C++						

UNIT:IV	Network Programming	12 HOURS
Network Programming : Introduction to Client Server Programming – Basics of TCP and UDP Protocols - Network Objects – Introduction to Socket Programming - Building an HTTP client Server; Threads and Concurrency : Creating, Joining and Execution of Threads using threading module - Thread Objects - Timer Threads - Locks and Semaphores - Events and Conditions - Thread Locals - Thread Queues - Process Queues and Tasks - Process Pools – Multithreading and Multiprocessing – Synchronizing and Thread Safety – Network protocols and Data Transfer – Asynchronous Programming with asyncio. Python for Automation : Automating system tasks with Python - Web scraping and data extraction automation - Automating emails and notifications - Automating GUI with PyAutoGUI - Scheduling tasks with Cron jobs or Task Scheduler - Scripting for cloud automation (AWS, Azure)		
UNIT:V	Python for Data Science and Machine Learning	12 HOURS
Basic operations on an image - Crop - Scale - Rotate - Flip - Changing contrast, brightness and color - Edge detection, blur, sharpening; Basic Numerical Processing : Introduction to numpy - Creation of vectors and matrices - Matrix manipulation; Basic Data Analysis : Introduction to Pandas - Pandas data structures – Series and DataFrame - Data wrangling using pandas - Loading a dataset into a dataframe - Selecting Columns from a dataframe - Selecting Rows from a dataframe - Adding new data in a dataframe - Deleting data from a dataframe; Basic Data Visualization : Introduction to Matplotlib and Seaborn - Scatter plot - Line plot - Bar chart - Histogram - Box plot; Statistical analysis using Python - Machine learning with Scikit-learn - Supervised and unsupervised learning techniques - Neural networks and deep learning overview		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars		
	TOTAL LECTURE HOURS	62 HOURS
Text Book(s)		
1	Amit Ashok Kamthane and Ashok N. Kamthane, “ Python Programming”, McGraw Hill Education; First edition, 2018	
2	Sebastian Raschka Vahid Mirjalili, Python Machine Learning, Ingram short title, 2017	
3	Abhishek Ratan, Eric Chou,, Pradeeban Kathiravelu, Dr. M. O. Faruque Sarker, Python Network Programming: Conquer all your networking challenges with the powerful Python language, Packt Publishing Limited,2019	
4	Dr. Vishal Goyal Dr. Monika Bansal, Dr. Munish Jindal, Dr. Harmandeep Kaur, Data Science using Python: A Step-by-Step Practical Approach for Beginners, Dps Publishing House; First Edition, 2022	
5	Fabrizio Romano, Gaston C. Hillar, Arun Ravindran, Learn Web Development with Python, Packt Publishing , 2018	

Reference Book(s)	
1	Dan Bader, Python Tricks, A Buffet of Awesome Python Features, Dan Bader, 2017
2	Harsh Bhasin, Python for Beginners, New Age International (P) Ltd Publishers, 2017
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	http://docs.python.org/tutorial/
2	https://nptel.ac.in/courses/106/106/106106182/
Course Designed By: Dr.T.RAMESH	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	S	S	S	M	S	M	S
CO3	L	S	L	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	M	S	M	M
CO4	L	M	M	M	S	S	M	S	M	M
CO5	L	M	M	M	S	S	M	S	M	M

*S-Strong; M-Medium; L-Low

Course code	25IT13B	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
Core/Elective/Supportive		Core	3	1	-	4
Pre-requisite		UG level – Cryptography and Network Security	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. This course focuses on the fundamentals of Cryptography and Network Security that are used in protecting both the information present in computer storage as well as information traveling over computer networks.						
2. Interest in network security has been spurred by the pervasive use of computer-based applications such as information systems, databases, and the Internet.						
3. Cryptography and Network security is enabled through securing data, computers, and networks. By the end of this course, student will be able to describe major network security issues and trends, and advise an individual seeking to protect data.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Recognize the network security policies, standards and procedures for completeness and alignment with generally accepted practices					K2
2	Explain the functionalities of Cryptography and Network security					K2
3	Describe Authentication and Security practice					K2
4	Analyze the root causes of cyber crime					K3
5	Implement suitable security techniques for a given problem					K3
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
Unit:I	Introduction				12 HOURS	
Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques - transposition techniques, steganography.						
Unit:II	Symmetric Encryption and Public-Key Cryptography				12 HOURS	
Block Ciphers and the Data Encryption Standard - The Data Encryption Standard - Advanced Encryption Standard - AES Key Expansion - Multiple Encryption and Triple DES.The RSA Algorithm - Description of the Algorithm - Computational Aspects - The Security of RSA.						
Unit:III	Electronic Mail and Web Security				12 HOURS	
Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME –DomainKeys Identified Mail - Web Security Considerations - Secure Socket Layer and Transport Layer Security - Transport Layer Security – HTTPS - Secure Shell (SSH).						

Unit:IV	IP and Wireless Network Security	12 HOURS
IP Security – Overview - IP Security Policy - Encapsulating Security Payload - Combining Security Associations - Internet Key Exchange - Cryptographic Suites. Wireless Network Security - Wireless LAN Overview - Wireless LAN Security - Wireless Application Protocol Overview - Wireless Transport Layer Security - WAP End-to-End Security.		
Unit:V	Intruders, Malicious Software and Firewalls	12 HOURS
Intruders - Intrusion Detection - Password Management Malicious Software - Types of Malicious Software – Viruses - Virus Countermeasures – Worms - Distributed Denial of Service Attacks. Firewalls - The Need for Firewalls - Firewall Characteristics - Types of Firewall.		
Unit:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars		
Latest developments/topics in Cryptography & Network Security		
	TOTAL LECTURE HOURS	62 HOURS
Text Book(s)		
1	William Stallings, “Cryptography & Network Security”, 6th Edition, Pearson Education, New Delhi 2013.	
2	William Stallings, “Network Security Essentials Applications and Standards”Third Edition, Pearson Education, 2008.	
Reference Books		
1	Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata Mc Graw Hill, 2007, Reprint 2015.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Foundations of CryptographyBy Prof. Ashish Choudhury, IIIT Bangalore.	
Course Designed By: Dr.W.ROSE VARUNA		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	L	S	S	L	M	S	S
CO3	S	S	S	M	M	M	L	M	L	S
CO3	M	M	S	S	S	M	L	M	M	M
CO4	L	L	M	S	S	S	L	M	L	S
CO5	M	M	M	S	S	M	L	M	L	S

*S-Strong; M-Medium; L-Low

Course Code	25IT13C	MODERN SOFTWARE ENGINEERING	L	T	P	C
Core / Elective / Supportive		Core	3	1	-	4
Pre-requisite		UG Level - Software Engineering – Methodologies	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. Understand the Modern approaches of Software engineering						
2. Understand the Agile Methodology						
3. Understand the Dev Ops frameworks and tools						
4. Design their own software project and implement it.						
5. Make the students, industry ready software engineer						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the Agile methodology				K1, K2	
2	Understand the requirement analysis				K2 ,K3	
3	Understand Dev Ops Tools				K1, K2	
4	Apply and analyze Agile and DevOps tools				K3, K4	
5	Design and Develop their own project				K5, K6	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit : I						
Unit : I		Agile Methodology			12 Hours	
Agile : The History and Value of Agile Software Development - The Beginnings of Software Development as Methodology - Organizational Culture Considerations with Agile – Agile Manifesto and Principles Understanding the Different Types of Agile : Extreme Programming (XP) – Scrum - Feature-Driven Development - Dynamic Systems Development Method - Lean Software Development - Kanban Method - Crystal Family – Certification - Implementing Tools and Techniques at Cayman						
Unit : II						
Unit : II		Roles and Requirement Analysis			12 Hours	
Agile Roles : Describing the Different Roles : Deep Dive into Scrum Roles - Roles in Other Methodologies – Kanban - Practical Examples of Roles; Agile Requirement Analysis : The New Way to Collect and Document Requirements - Old Form of Requirements Gathering - Agile Requirements in Scrum - Additions and Considerations from the Other Methodologies - Enhancing Requirements - From User Stories to Deliverables – Communication - Lean Product Development and the Minimum Viable Product (MVP)						

Unit : III	Planning, Testing and Documenting	12 Hours
Grooming and Planning : Product Backlog (Scrum and XP) - Prioritization of Stories – Estimating - Scrum: Product Backlog Grooming – Scrum: Sprint Planning - Extreme Programming: XP Planning Game - Maintenance of Legacy Code - Triple Constraints – Kanban Testing, Quality, and Integration : Quality - Refactored Code; Tracking and Reporting : Kanban – Tracking - Meetings or Ceremonies - Measuring Success in Agile		
Unit : IV	DevOps Basics	12 Hours
Introduction to DevOps - DevOps Framework - DevOps Process - DevOps Best Practices - DevOps Process - Source Code Management - Code Review - Configuration Management - Build Management - Artifacts Repository Management - Release Management - Test Automation - Continuous Integration - Continuous Delivery - Continuous Deployment - Infrastructure as Code - Key Application Performance Monitoring/Indicators		
Unit : V	Dev Ops Frame works & Tools	12 Hours
DevOps Frameworks - DevOps Maturity Life Cycle - DevOps Maturity Map - DevOps Progression Framework/Readiness Model - DevOps Maturity Checklists - Agile Framework for DevOps Process Projects - Agile Ways of Development Tools : Jenkins – GITHub – Gerrit - Chef – Ansible - Ansible – splunk – Nagios		
Unit : VI	CONTEMPORARY ISSUES	2 Hours
Expert lectures, online seminars – webinars, and Case studies of projects		
TOTAL LECTURE HOURS		62 Hours

Text Book(s):
1. Sondra Ashmore Ph.D., Kristin Runyan, Introduction to Agile Methods, Addison-Wesley Professional 2014 2. Andrew Stellman, Jennifer Greene - Learning Agile: Understanding Scrum, XP, Lean, and Kanban, O Reilly, 2015 3. More Agile Testing: Learning Journeys for the Whole Team By Janet Gregory, Lisa Crispin, Addison Wesley, 2015 4. Dive Sricharan Vadapalli, DevOps: Continuous Delivery, Integration, and Deployment with DevOps , Packt, 2018 5. Robert C. Martin, “Agile Software Development, Principles, Patterns and Practices”, First International Edition, Prentice Hall.

Reference Book(s) :	
1	Andrew Stellman, Jennifer Greene, Learning Agile: Understanding Scrum, XP, Lean, and Kanban, O Reilly, 2015
2	Jim Highsmith, Agile Project Management: Creating Innovative Products, Second Edition , Addison-Wesley Professional, 2009
3	James A. Crowder, Shelli Friess, Agile Project Management: Managing for Success, , Springer 2014
4	Lisa Crispin, Janet Gregory, Agile Testing: A Practical Guide For Testers And Agile Teams, , Pearson, 2010
5	Thomas Uphill, John Arundel, Neependra Khare, Hideto Saito, Hui-Chuan Chloe Lee, Ke-Jou Carol HsuDevOps: Puppet, Docker, and Kubernetes , Packt, 2017
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	Agile Software Development, https://www.edx.org/course/agile-software-development
2	Agile Software Development, https://www.coursera.org/learn/agile-software-development
3	The Complete Guide to Agile Software Development https://clearbridgemobile.com/complete-guideagile-software-development
4	Agile Fundamentals Ebook: A Complete Guide for Beginners, https://agileken.com/agilefundamentals-ebook/
5	https://devops.com/most-popular-open-source-devops-tools/
6	https://www.guru99.com/devops-tutorial.html
7	Open Source Book on DevOps: https://github.com/jidibinlin/Free-DevOps-Books/blob/master/book/Practical%20DevOps.pdf
Course Designed By: Dr.T.RAMESH	

Mapping with Programming Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	M	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Course code	25IT13P	ADVANCED PYTHON PROGRAMMING -LAB	L	T	P	C
Core/Elective/Supportive		Core	-	-	2	2
Pre-requisite		Basic Python Programming	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. Understand the advanced Python Programming						
2. Get a Job in the IT industry as a python programmer						
3. Use Python programming in their research						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basics of Python Programming					K2
2	Understand OOPs and Libraries on Python					K2
3	Design and Develop Python Programming					K3
4	Get a job in the IT industry as a Python Programmer					K6
5	Work as a freelance Python Programmer					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
Functional Programming						
6 HOURS						
Experiments on List, Tuples, Sets and Dictionary - Closures and Decorators - Generators and Coroutines - Generator Expressions - Lambdas; File Handling and Regular Expressions						
UNIT:II						
OOPS and DATABASE						
6 HOURS						
Experiment on OOPS and Database						
UNIT:III						
Web Programming						
6 HOURS						
Experiment on – JSON, XML, Rest Interfaces, Jinja2 - Handling HTTP requests and responses - Authentication and Authorization - Web scrabbling, Calling C/C++ from Python - Using ctypes - Extension Modules in C/C++ - Raising Python Exceptions - Calling Python from C/C++ - Embedding Python Interpreter - Importing Python Modules from -C++Converting Python Objects to C/C++ - Invoking Python Functions from C/C++						
UNIT:IV						
Network Programming						
6 HOURS						
Experiment on Socket Programming, threading , Asynchronous Programming with asyncio. Automating system tasks with Python						

UNIT:V	Python for Data Science and Machine Learning	6 HOURS
Basic operations on an image,Basic Numerical Processing, Basic Data Analysis, Basic Data Visualization, Statistical analysis using Python		
UNIT:VI	Contemporary Issues	2 HOURS
Expert lectures, online seminars – webinars		
	TOTAL LECTURE HOURS	32 HOURS
Text Book(s)		
1	Amit Ashok Kamthane and Ashok N. Kamthane, “ Python Programming”, McGraw Hill Education; First edition, 2018	
2	Sebastian Raschka Vahid Mirjalili, Python Machine Learning, Ingram short title, 2017	
3	Abhishek Ratan, Eric Chou,, Pradeeban Kathiravelu, Dr. M. O. Faruque Sarker, Python Network Programming: Conquer all your networking challenges with the powerful Python language, Packt Publishing Limited,2019	
4	Dr. Vishal Goyal Dr. Monika Bansal, Dr. Munish Jindal, Dr. Harmandeep Kaur, Data Science using Python: A Step-by-Step Practical Approach for Beginners, Dps Publishing House; First Edition, 2022	
5	Fabrizio Romano, Gaston C. Hillar, Arun Ravindran, Learn Web Development with Python, Packt Publishing , 2018	
Reference Book(s)		
1	Dan Bader, Python Tricks,A Buffet of Awesome Python Features, Dan Bader, 2017	
2	Harsh Bhasin, Python for Beginners, New Age International (P) Ltd Publishers, 2017	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	http://docs.python.org/tutorial/	
2	https://nptel.ac.in/courses/106/106/106106182/	
Course Designed By: Dr.T.RAMESH.		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	S	S	S	M	S	M	S
CO3	L	S	L	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	M	S	M	M
CO4	L	M	M	M	S	S	M	S	M	M
CO5	L	M	M	M	S	S	M	S	M	M

*S-Strong; M-Medium; L-Low

Course code	25IT13Q	CRYPTOGRAPHY AND NETWORK SECURITY - LAB	L	T	P	C
Core/Elective/Supportive		Core	-	-	2	2
Pre-requisite		UG level – Cryptography and Network Security	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to: 1. To learn different cipher techniques 2. To implement the algorithms DES, RSA, MD5, SHA-1 3. To use network security tools and vulnerability assessment tools						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Develop code for classical Encryption Techniques to solve the problems.					K5
2	Build cryptosystems by applying symmetric and public key encryption algorithms.					K6
3	Construct code for authentication algorithms.					K4
4	Develop a signature scheme using Digital signature standard.					K6
5	Demonstrate the network security system using open source tools					K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
UNIT:I						
Substitution and Transposition techniques			6 HOURS			
1. Perform encryption, decryption using the following substitution techniques. Ceaser cipher ii. Playfair cipher iii. Hill Cipher iv. Vigenere cipher. 2. Perform encryption and decryption using following transposition techniques Rail fence - Row & Column Transformation						
UNIT:II						
DES & AES algorithm			6 HOURS			
3. Apply DES algorithm for practical applications. 4. Apply AES algorithm for practical applications.						
UNIT:III						
RSA & Diffie-Hellman Key Exchange			6 HOURS			
5. Implement RSA Algorithm using HTML and JavaScript 6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.						
UNIT:IV						
Digital Signature			6 HOURS			
7. Calculate the message digest of a text using the SHA-1 algorithm 8. Implement the SIGNATURE SCHEME - Digital Signature Standard. 9. Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.						
UNIT:V						
Defeating Malware			6 HOURS			
10. Automated Attack and Penetration Tools Exploring N-Stalker, a Vulnerability Assessment Tool 11. Defeating Malware - Building Trojans, Rootkit Hunter						

UNIT:VI	Contemporary Issues	2 HOURS
Expert lectures, online seminars – webinars		
Latest developments/topics in Cryptography & Network Security		
	TOTAL LECTURE HOURS	32 HOURS
Text Book(s)		
1	William Stallings, “Cryptography & Network Security”, 6th Edition, Pearson Education, New Delhi 2013.	
2	William Stallings, “Network Security Essentials Applications and Standards” ,Third Edition, Pearson Education, 2008.	
Reference Books		
1	Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata McGraw Hill, 2007, Reprint 2015.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Foundations of CryptographyBy Prof. Ashish Choudhury, IIIT Bangalore.	
Course Designed By: Dr.W.ROSE VARUNA		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	L	M	S	S
CO3	S	S	S	S	S	S	L	M	M	S
CO3	M	M	M	S	S	L	L	L	M	M
CO4	L	L	S	S	S	L	L	M	S	M
CO5	M	M	S	S	S	M	L	L	S	S

*S-Strong; M-Medium; L-Low

Course code	25IT23A	C# with .NET Programming	L	T	P	C
Core/Elective/Supportive		Core	3	1	-	4
Pre-requisite		.NET Framework at UG level	Syllabus Version	2025-26		
Course Objectives:						
The Main Objectives of this Course are to: 1. Introduce the fundamental syntax and structure of C# programming. 2. Develop proficiency in object-oriented programming concepts using C#. 3. Explore data structures and collections provided by .NET. 4. Understand exception handling, delegates, events, and lambda expressions. 5. Apply LINQ for querying data collections in an efficient and expressive manner.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand and apply basic C# syntax, data types, operators, and control structures to create simple programs.					K1
2	Implement and use advanced C# types such as classes, structs, interfaces, and various built-in collections effectively.					K2
3	Apply object-oriented principles including inheritance, generics, and object lifetime management in software development.					K3
4	Handle runtime anomalies using exception handling techniques and utilize delegates, lambdas, and events for flexible program design.					K4
5	Use LINQ to perform efficient data querying and manipulation with various data sources.					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
INTRODUCTION TO C#			12 HOURS			
C# Defining features – C# standards and implementation – Anatomy of simple program. Variables and Operators: Scope of local variables – Statements and Expressions – Comments and Whitespace – Preprocessing Directives – Fundamental data Types – Operators – Flow Control – Patterns.						
UNIT:II						
TYPES AND COLLECTIONS			12 HOURS			
Types: Classes – Structs – Members – Interfaces – Enums – Other Types – Partial types and Methods. Collections: Arrays – List and Sequence Interfaces – Implementing Lists and Sequences – Addressing Elements with Index and Range Index - Directories – Sets – Queues and Stacks - Linked Lists – Concurrent Collections – Immutable Collections.						

UNIT:III	INHERITANCE AND OBJECT LIFETIME	12 HOURS
Inheritance: Inheritance and Conversions – Interface Inheritance – Generics – System.Object – Accessibility and Inheritance – Virtual Methods – Sealed Methods and Classes – Accessing Base Members – Inheritance and Construction – Special Base Types. Object Lifetime: Garbage Collection – Destructors and Finalization - IDisposable – Boxing.		
UNIT:IV	EXCEPTIONS, DELEGATES, LAMBDAS, AND EVENTS	12 HOURS
Exceptions: Exception Sources – Handling Exceptions – Throwing Exceptions – Exception Types – Unhandled Exceptions. Delegates, Lambdas, and Events: Delegate Types – Anonymous Functions – Events – Delegates Versus Interfaces.		
UNIT:V	LINQ	12 HOURS
LINQ: Query Expressions – Deferred Evaluation – LINQ, Generics and IQueryable – Standard LINQ Operators – Sequence Generation – Other LINQ Implementations.		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars		
	TOTAL LECTURE HOURS	62 HOURS
Text Book(s)		
1. Ian Griffiths, “Programming C# 8.0 Build Cloud, Web, and Desktop Applications”, O’Reilly. 2020		
Reference Books		
1. Mastering_Visual_C#_.NET by Jason Price, Mike Gunderloy		
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1. Advanced Diploma in .NET Technologies by National Institute of Electronics & Information Technology, Calicut https://www.nielit.gov.in/calicut/index.php		
Course Designed By: Dr. W. Rose Varuna		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	L
CO3	S	S	M	S	S	S	S	S	S	S
CO4	L	M	L	L	S	M	S	S	S	S
CO5	M	L	M	S	L	S	S	S	L	M

*S-Strong; M-Medium; L-Low

Course code	25IT23B	WORDPRESS DEVELOPMENT	L	T	P	C
Core/Elective/Supportive		Core	3	1	-	4
Pre-requisite		Internet Basic HTML, and CSS Programming	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1	To understand the working of a content Management System					
2	To Create a CMS WordPress Site					
3	To Use Plugins and Widgets in the WordPress Site					
Expected Course Outcomes						
On the successful completion of the course						
1. Students will also be able to understand the basics of WordPress					K1	
2. To get exposure to Model development of Web Page Development					K2	
3. To apply the modern tools to Web Development					K3	
4. Students will be able to design their own web sites					K4	
5. To get a job in the Web Development Domain					K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit I	Introduction to WordPress Development				12 HOURS	
Overview of WordPress - introduction to web server with WordPress - WordPress file system - WordPress development fundamentals - local development environment - Creating and modifying posts, pages, and users – Permalinks - rewrite module on both Apache and Nginx - dashboard pages and font-end pages request loads – Action Hooks and Filter Hooks - WordPress database - WordPress coding standards - Enabling the debug.log						
Unit II	Themes and Template				12 HOURS	
WordPress themes - Classic themes vs block themes - Theme requirements - Templates and template parts - Template Hierarchy - Classic themes – Template tags and conditional tags - Block themes – patterns - Block themes – theme.json - Enqueuing CSS and JavaScript - Custom functions						

Unit III	Plugins and Internationalization	12 HOURS
WordPress plugins : Plugin requirements - Creating custom post types and taxonomies - Using post meta - Enqueuing CSS and JavaScript - developing plugins securely - Preventing common vulnerabilities Internationalization : The commonly used Internationalization Functions - introduction to Roles and Capabilities - create/modify/remove roles and capabilities - check user capabilities - Custom content types and capabilities		
UNIT:IV	WordPress API and REST API	12 HOURS
WordPress APIs : Responsive Images - Dashboard widgets – Database - Filesystem - Global Variables – Metadata – Options - HTTP Requests –Rewrite –Settings –Shortcode – Transients WordPress REST API : Using the WordPress REST API - Interacting with the WordPress REST API - WordPress REST API under the hood -REST API working principles, details about design decisions - Interacting with the WordPress REST API - Extending the WordPress REST API - custom fields, authentication - modifying responses - creating custom routes and endpoints		
UNIT:V	WordPress Blocks and Multisite	12 HOURS
WordPress blocks : Setting up the block development requirements - Building simple block - Converting a Shortcode into a Block - Styling your WordPress Blocks - Using Block Attributes to Enable User Editing WordPress multisite : Setting up a Multisite network - Managing a Multisite network - Advanced Multisite Management - Building plugins and themes that support multisite (WIP) - The differences between developing for multisite vs single site (WIP)		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Assignments, Seminar, Projects, and case studies		
	TOTAL LECTURE HOURS	62 HOURS

Text Books	
1	Brad Williams, David Damstra and Hal Stern, Professional WordPress Design and Development, Wiley, 2015
2	Rakhitha Nimesh Ratnayake, Wordpress Web Application Development, O'Reilly, 2017,

Reference Books :	
1	Icon Karol Król, WordPress Complete : A comprehensive guide to WordPress development from scratch , Packt Publishing 2017
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://wordpress.com/blog/category/resources/
2	https://learn.wordpress.org
Course Designed By: Dr.T.Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	S	M	S	M
CO2	S	S	S	S	M	S	M	L	S	L
CO3	M	M	L	L	L	M	L	M	M	M
CO4	M	S	M	L	S	S	M	L	L	S
CO5	M	S	S	M	M	L	S	M	M	L

*S-Strong; M-Medium; L-Low

Course code	25IT23C	OPEN SOURCE TECHNOLOGIES	L	T	P	C
Core/Elective/Supportive		Core	3	1	-	4
Pre-requisite		Knowledge about Operating System, Internet and Web Programming	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to: 1. Students are able to learn fundamentals of open source operating system 2. Students are able to learn open source Desktop environment 3. Develop their own open source software using these tools						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Familiar with open source Operating System					K2
2	Familiar with open source software tools and package					K2
3	Design their own software package using open source software					K3
4	Get a job with their own open source software development skills					K6
5	Contribute to the open software community					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
		FOSS	12 HOURS			
Open Source - Definition – Terms - Technology – Need - Free and Open Source Software (FOSS) Open Source Software Licenses..						
UNIT:II						
		Linux	12 HOURS			
Linux Kernel -Architecture - Internal representation of files -Inodes –Structure of a regular file –Directories – shell - Basic commands - Desktop environment –KDE –GNOME - Development environment tools and systems						

UNIT:III	Perl	12 HOURS
Overview of Perl – Variables – Statements - Scalar values - Operators - Control structures – regular expressions – Arrays – Hashes – List processing - Pattern Matching – File Handling		
UNIT:IV	PHP	12 HOURS
Basic Syntax of PHP – web environment - Common PHP Script - Elements -Using Variables - Constants – Data types - Operators - Statements – Flow Control functions – Dates and Times - Working With Arrays - Using Functions - String Manipulation and Regular Expression - File and Directory Handling - Working With Forms - OOP		
UNIT:V	MySQL	12 HOURS
Data Types -Primary Keys and Auto Increment Fields – Queries - SQL programs - Create Database and Tables – ODBC - Connecting to MySQL with PHP - Creating, opening and Closing a Connection - Inserting data with PHP - Retrieving data with PHP.		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars		
TOTAL LECTURE HOURS		62 HOURS
Text Book(s)		
1	Michael Hausenblas, “Learning Modern Linux” O'Reilly, 2022	
2	William "Bo" Rothwell, “Beginning Perl Programming: From Novice to Professional”, Apress,2019	
3	Jon Duckett, “PHP & MySQL” Wrox2022	
Reference Book		
1	Marty Matthews, “Php And Mysql Web Development: A Beginner's Guide” McGraw Hill, 2015	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://swayam.gov.in/nd2_aic20_sp24/preview
2	https://swayam.gov.in/nd2_aic20_sp31/preview
3	https://swayam.gov.in/nd2_aic20_sp32/preview
4	https://swayam.gov.in/nd1_noc19_cs41/preview
Course Designed By: Dr. T. RAMESH	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	S	S	S	S	S	S	S	L
CO3	L	M	S	S	S	S	S	S	S	L
CO3	L	M	S	S	S	S	S	S	S	M
CO4	L	M	S	S	S	S	S	S	S	S
CO5	L	M	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Course code	25IT23P	C# WITH .NET PROGRAMMING - LAB	L	T	P	C
Core/Elective/Supportive		CORE	-	-	2	2
Pre-requisite		.NET FRAMEWORK AT UG LEVEL	Syllabus Version		2025-26	
Course Objectives:						
The Main Objectives of this Course are to:						
1. Introduce the fundamental syntax and structure of C# programming.						
2. Develop proficiency in object-oriented programming concepts using C#.						
3. Explore data structures and collections provided by .NET.						
4. Understand exception handling, delegates, events, and lambda expressions.						
5. Apply LINQ for querying data collections in an efficient and expressive manner.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand and apply basic C# syntax, data types, operators, and control structures to create simple programs.					K1
2	Implement and use advanced C# types such as classes, structs, interfaces, and various built-in collections effectively.					K2
3	Apply object-oriented principles including inheritance, generics, and object lifetime management in software development.					K3
4	Handle runtime anomalies using exception handling techniques and utilize delegates, lambdas, and events for flexible program design.					K4
5	Use LINQ to perform efficient data querying and manipulation with various data sources.					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
INTRODUCTION TO C#			6 HOURS			
Implementing Variables and Operators – Implementing data Types – Operators – Flow Control – Patterns.						
UNIT:II						
TYPES AND COLLECTIONS			6 HOURS			
Implementing Classes and Interfaces – Arrays – List and Sequence Interfaces – Directories – Sets – Queues and Stacks - Linked Lists – Implementing Collections.						
UNIT:III						
INHERITANCE AND OBJECT LIFETIME			6 HOURS			
Inheritance – Generics – Virtual Methods – Destructors and Finalization - IDisposable – Boxing.						
UNIT:IV						
EXCEPTIONS, DELEGATES, LAMBDA, AND EVENTS			6 HOURS			
Implementing Exception – Implementing Delegate – Events.						

UNIT:V	LINQ	6 HOURS
Implementing LINQ - Implementing Generics and IQueryable – Implementing Standard LINQ Operators.		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars		
	TOTAL LECTURE HOURS	32 HOURS
Text Book(s)		
1	Ian Griffiths,Programming C# 8.0 Build Cloud, Web, and Desktop Applications, O’Reilly. 2020	
Reference Book		
1	Mastering_Visual_C#_.NET by Jason Price, Mike Gunderloy	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Advanced Diploma in .NET Technologies by National Institute of Electronics & Information Technology,Calicut https://www.nielit.gov.in/calicut/index.php	
Course Designed By: Dr. W. Rose Varuna		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	L
CO3	S	S	M	S	S	S	S	S	S	S
CO4	L	M	L	L	S	M	S	S	S	S
CO5	M	L	M	S	L	S	S	S	L	M

*S-Strong; M-Medium; L-Low

Course code	25IT23Q	WORDPRESS DEVELOPMENT - LAB	L	T	P	C
Core/Elective/Supportive		Core	-	-	2	2
Pre-requisite		Internet Basic HTML, and CSS Programming	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1	To understand the working of a content Management System					
2	To Create a CMS WordPress Site					
3	To Use Plugins and Widgets in the WordPress Site					
Expected Course Outcomes						
On the successful completion of the course						
1	Students will also be able to understand the basics of WordPress					K1
2	To get exposure to Model development of Web Page Development					K2
3	To apply the modern tools to Web Development					K3
4	Students will be able to design theirs own web sites					K4
5	To get a job in the Web Development Domain					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit I		WordPress Development			6 HOURS	
Experiments on WordPress basics						
Unit II		Themes and Template			6 HOURS	
Experiments on WordPress themes and Template						
Unit III		Plugins and Internationalization			6 HOURS	
Experiment on WordPress plugins and Internationalization						
UNIT:IV		WordPress API and REST API			6 HOURS	
Experiments on WordPress APIs and REST API						
UNIT:V		WordPress Blocks and Multisite			6 HOURS	
Experiments on WordPress blocks and Multisite						
UNIT:VI		CONTEMPORARY ISSUES			2 HOURS	
Assignments, Seminar, Projects, and case studies						
		TOTAL LECTURE HOURS			32 HOURS	

Text Books	
1.	Brad Williams, David Damstra and Hal Stern, Professional WordPress Design and Development, Wiley, 2015
2.	Rakhitha Nimesh Ratnayake, Wordpress Web Application Development, O'Reilly, 2017,
Reference Book:	
1.	Icon Karol Król, WordPress Complete : A comprehensive guide to WordPress development from scratch , Packt Publishing 2017
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://wordpress.com/blog/category/resources/
2	https://learn.wordpress.org
Course Designed By: Dr.T.Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	S	M	S	M
CO2	S	S	S	S	M	S	M	L	S	L
CO3	M	M	L	L	L	M	L	M	M	M
CO4	M	S	M	L	S	S	M	L	L	S
CO5	M	S	S	M	M	L	S	M	M	L

*S-Strong; M-Medium; L-Low

Course Code	25IT33A	INTERNET OF THINGS	L	T	P	C
Core/ Elective/ Supportive	CORE		3	1	-	4
Pre-requisite	Basic knowledge of hardware, programming in c		Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. In order to gain knowledge on bases of Internet of Things (IoT), IoT Architecture, and the Protocols related to IoT						
2. To understand the concept of the Web of Thing and the relationship between the IoT and WoT.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Gain the basic knowledge about IoT and they will be able to use IoT related products in real life.				K2/ K3	
2	It helps to rely less on physical resources and started to do their work smarter.				K4/K5/K6	
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6– Create						
UNIT:I	INTRODUCTION to IoT			12 HOURS		
Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels and Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.						
UNIT:II	IoT ARCHITECTURE			12 HOURS		
M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture						
UNIT:III	IoT PROTOCOLS			12 HOURS		
Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security						
UNIT:IV	WEB OF THINGS			12 HOURS		
Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.						

UNIT:V	APPLICATIONS	12 HOURS
The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars		
	TOTAL LECTURE HOURS	62 HOURS
Text Book(s)		
1	Fundamentals of Internet of Things, Sudhir Kumar · 2021, CRC Press	
2	Internet of Things (IoT) - Principles, Paradigms and Applications of IoT, Dr Kamlesh Lakhwani, Dr Hemant Kumar Gianey, Joseph Kofi Wireko, Kamal Kant Hiran, 2020	
3	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017	
4	Internet of Things (IoT) - Systems and Applications, Jamil Y. Khan, Mehmet R. Yuce, Jenny Stanford Publishing, 2019	
5	Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands on approach”, Universities Press, 2015.	
Reference Book(s)		
1	Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010.	
2	Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Introduction to IOT https://nptel.ac.in/courses/106.105.106105166/	
Course Designed By: Dr.R.VADIVEL		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	S	M	S	M
CO2	S	S	S	S	M	S	M	L	S	L
CO3	M	M	L	L	L	M	L	M	M	M
CO4	M	S	M	L	S	S	M	L	L	S
CO5	M	S	S	M	M	L	S	M	M	L

*S-Strong; M-Medium; L-Low

Course code	25IT33B	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	L	T	P	C
			3	1	-	4
Pre-requisite	UG-Level AI and Machine Learning		Syllabus version		2025-26	
Course objectives						
1. To understand artificial intelligence						
2. To understand machine learning						
3. To familiar with AL & ML algorithms						
Expected Course Outcomes:						
On the successful completion of the course						
1	Students will also be able to understand basics of AI					K1
2	To get exposure to students on the machine learning					K2
3	To understand the basics of supervised learning and Unsupervised Learning					K3
4	Students will Apply AI & ML algorithms to solve the problems of complexity					K4
5	To get a job in the AL & ML domain					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I	Introduction to AI & ML				12 HOURS	
Introduction to AI : History of AI, Comparison of AI with Data Science, Need of AI in Mechanical Engineering, introduction to Machine Learning. Basics: Reasoning, problem solving, Knowledge representation, Planning, Learning, Perception, Motion and manipulation. Intelligent Agents, Problem-Solving Agents. Approaches to AI: Cybernetics and brain simulation, Symbolic, Sub-symbolic, Statistical. Approaches to ML: Supervised learning, Unsupervised learning, Reinforcement learning						
UNIT:II	Searching, Feature Extraction and Selection				12 HOURS	
Searching for Solutions - Breadth-first search, Depth-first search, Hill-climbing search, Simulated-annealing search, Local Search in Continuous Spaces. Feature extraction: Statistical features, Principal Component Analysis. Feature selection: Ranking, Decision tree - Entropy reduction and information gain, Exhaustive, best first, Greedy forward & backward. Games : Optimal Decisions in Games, Alpha–Beta Pruning, Applications						
UNIT:III	Probabilistic Reasoning, Classification & Regression				12 HOURS	
Probabilistic Reasoning: Acting under Uncertainty, Basic Probability Notation Bayes’ Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks. Classification: Decision tree, Random forest, Naive Bayes, Support vector machine. Regression: Logistic Regression, Support Vector Regression. Regression trees: Decision tree, random forest, K-Means, K-Nearest Neighbor (KNN). Applications						
UNIT:IV	Development of ML Model				12 HOURS	
Problem identification: classification, clustering, regression, ranking. Steps in ML modeling, Data Collection, Data pre-processing, Model Selection, Model training (Training, Testing, K-fold Cross Validation), Model evaluation (understanding and interpretation of confusion matrix, Accuracy, Precision, Recall, True positive, false positive etc.), Hyper parameter Tuning, Predictions. Applications						

UNIT:V		Reinforced and Deep Learning	12 HOURS
Characteristics of reinforced learning; Algorithms: Value Based, Policy Based, Model Based; Positive vs Negative Reinforced Learning; Models: Markov Decision Process, Q Learning. Characteristics of Deep Learning, Artificial Neural Network, Convolution Neural Network. Applications.			
UNIT : VI		CONTEMPORARY ISSUES	2 HOURS
		TOTAL LECTURER HOURS	62 HOURS
Text Book(s)			
1	Deisenroth, Faisal, Ong, Mathematics for Machine Learning, Cambridge University Press, 2020.		
2	B Joshi, Machine Learning and Artificial Intelligence, Springer, 2020.		
3	Parag Kulkarni and Prachi Joshi, “Artificial Intelligence – Building Intelligent Systems”, PHI learning Pvt. Ltd., ISBN – 978-81-203-5046-5, 2015		
4	Stuart Russell and Peter Norvig (1995), “Artificial Intelligence: A Modern Approach,” Third edition, Pearson, 2003.		
Reference Book(s)			
1	Solanki, Kumar, Nayyar, Emerging Trends and Applications of Machine Learning, IGI Global, 2018.		
2	Mohri, Rostamizdeh, Talwalkar, Foundations of Machine Learning, MIT Press, 2018.		
3	Kumar, Zindani, Davim, Artificial Intelligence in Mechanical and Industrial Engineering, CRC Press, 2021.		
4	Zsolt Nagy - Artificial Intelligence and Machine Learning Fundamentals-Apress (2018)		
5	Artificial Intelligence by Elaine Rich, Kevin Knight and Nair, TMH		
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]			
1	http://nptel.ac.in/courses/111101003/		
2	https://nptel.ac.in/courses/106/106/106106202/		
3	https://nptel.ac.in/courses/112/103/112103280/		
4	https://www.analyticsvidhya.com/		
Course Designed By : Dr.T. RAMESH			

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	S	M	S	M
CO2	S	S	S	S	M	S	M	L	S	L
CO3	M	M	L	L	L	M	L	M	M	M
CO4	M	S	M	L	S	S	M	L	L	S
CO5	M	S	S	M	M	L	S	M	M	L

*S-Strong; M-Medium; L-Low

Course code	25IT33C	RESEARCH METHODOLOGY	L	T	P	C
Core/Elective/Supportive		Core	4	1	-	4
Pre-requisite		Algorithms at UG level	Syllabus Version		2025-26	
Course Objectives:						
The Main Objectives of this Course are to:						
1. Understand and apply various research methodologies including qualitative, quantitative, and mixed methods.						
2. Construct valid and reliable measurement tools and scales for data collection.						
3. Prepare a well-structured research report that effectively communicates the research process, findings, and conclusions.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Demonstrate a clear understanding of fundamental research methods, including qualitative, quantitative, and mixed-method approaches.					K2
2	Design research studies with well - defined objectives, hypotheses, and appropriate methodological frameworks.					K4
3	Develop and validate measurement instruments and scales suitable for empirical data collection.					K3
4	Interpret research data using statistical and/or qualitative tools to derive meaningful insights.					K3
5	Compose comprehensive research reports that follow academic and professional standards of presentation and documentation.					K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I	RESEARCH METHODS			12 HOURS		
Research Methodology: An Introduction: Meaning of Research - Objectives of Research - Types of Research -Research Approaches - Significance of Research - Research methods versus Methodology - Research and Scientific Method - Research Process - Criteria of good Research - Problem Encountered by Researchers in India. Defining the Research Problem: What is Research Problem? Selecting the Problem - Necessity of Defining the Problem - Technique involved in Defining the Problem.						
UNIT:II	RESEARCH DESIGN			12 HOURS		
Research Design: Meaning of Research Design - Need for Research Design - Features of a Good Design - Important Concepts Relating to Research Design - Different research design - Basic principles of Experimental Designs - Importance Experimental Designs.						
UNIT:III	DESIGN AND MEASUREMENT			12 HOURS		
Design of Sample Surveys: Introduction-Sample Design - Sampling and Non-sampling Errors - Sample Survey Vs. Census Survey - Types of Sampling Designs. Measurement and Scaling: Quantitative and Qualitative Data - Classifications of Measurements Scales - Goodness of Measurement Scales - Sources of Error in Measurement - Techniques of Developing Measurement Tools-Scaling - Scale Classification Bases.						

UNIT:IV		DATA COLLECTION AND PREPARATION	12 HOURS
Data Collection: Introduction - Experiments and Surveys - Collection of Primary Data - Collection of Secondary Data - Selection of Appropriate Method for Data Collection. Data Preparation: Data Preparation Process - Some Problems in Preparation Process - Missing Values and Outliers - Types of Analysis - Statistics in Research.			
UNIT:V		INTERPRETATION AND REPORT WRITING	12 HOURS
Meaning of Interpretation - Techniques of Interpretation - Precautions in Interpretation - Significance of Report Writing - Different Steps in Writing Report - Layout of the Research Report - Types of Reports - Oral Presentation - Mechanics of Writing A Research Report - Precautions for Writing Research Reports.			
UNIT:VI		CONTEMPORARY ISSUES	2 HOURS
Expert Lectures, Online Seminars – Webinars			
		TOTAL LECTURE HOURS	62 HOURS
Text Book(s)			
1	C. R. Kothari, “Research Methodology Methods & Techniques” 4 th Multi Colour Edition, New Age International (P) Limited, Publishers, 2019.		
Reference Books			
1	Dr.Rajammal P. Devadas,”A. Handbook on Methodology of Research-Sri Ramakrishna Mission Vidyalyaya College of Rural Higher Education”.		
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]			
1	Research Methodology by Prof. Edamana Prasad, Prof. Prathap Haridoss , IIT Madras		
Course Designed By: Dr. W. Rose Varuna			

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	L
CO3	S	S	M	S	S	S	S	S	S	S
CO4	L	M	L	L	S	M	S	S	S	S
CO5	M	L	M	S	L	S	S	S	L	M

*S-Strong; M-Medium; L-Low

Course Code	25IT33P	INTERNET OF THINGS - LAB	L	T	P	C
Core/ Elective/ Supportive		Core	-	-	2	2
Pre-requisite		UG-Degree level: Basic in Cloud Computing and Internet of Things	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to: 1. In order to gain knowledge on the bases of the Internet of Things (IoT), IoT Architecture, and the Protocols related to IoT 2. To understand the concept of the Web of Things and the relationship between the IoT and WoT. 3. To study IoT Access technologies. 4. To study the design methodology and different IoT hardware platforms. 5. Familiarization with Arduino/ Raspberry Pi and perform necessary software installation						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Gain the basic knowledge about IoT and they will be able to use IoT-related products in real life.				K2/K3	
2	It helps to rely less on physical resources and started to do their work smarter.				K3	
3	It helps to Easy interface to all microprocessors.				K3	
4	Able to realize the revolution of the Internet in Mobile Devices, Cloud & Sensor Networks.				K3	
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create						
UNIT:I		INTRODUCTION TO IOT			6 HOURS	
Experiment on Basic Electronics, and IOT tools						
UNIT:II		IOT ARCHITECTURE			6 HOURS	
Experiments on sensors						
UNIT:III		IOT PROTOCOLS			6 HOURS	
Experiments on Networking Protocols						
UNIT:IV		WEB OF THINGS			6 HOURS	
Experiment on WEB OF THINGS						
UNIT:V		RESOURCE MANAGEMENT AND DATA ANALYTICS			6 HOURS	
Experiments on IOT Resource Management, High Speed Wireless Applications, IOT Data Analytics						

UNIT:VI		CONTEMPORARY ISSUES	6 HOURS
Expert lectures, online seminars – webinars			
Applications in the Internet of Things.			
	TOTAL LECTURE HOURS		32 HOURS
Text Book(s)			
1	Jamil Y. Khan, Mehmet R. Yuce, Jenny , Internet of Things (IoT)- Systems and , Stanford Publishing, 2019		
2	Dr KamleshLakhwani, Dr Hemant Kumar Gianey, Joseph Kofi Wireko, Kamal Kant Hiran, Internet of Things (IoT)- Principles, Paradigms and Applications of IoT, BPB Publications,. 1st edition 2020		
3	Jan Ho" ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-toMachine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.		
Reference Book(s)			
1	Sudhir Kumar, Fundamentals of Internet of Things CRC Press, 2021.		
2	Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things – Key applications and Protocols”, Wiley, 2012.		
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]			
1	Introduction to IOT, https://nptel.ac.in/courses/106.105.106105166/		
Course Designed By: Dr.R.VADIVEL			

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course Code	23IT33Q	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING - LAB	L	T	P	C
			-	-	2	2
Pre-requisite		UG-Level AI and Machine Learning and Python	Syllabus Version		2025-26	
Course objectives						
1. To understand artificial intelligence						
2. To understand machine learning						
3. To familiarize with AL & ML algorithms						
Expected Course Outcomes:						
On the successful completion of the course						
1	Students will also be able to understand the basics of AI					K1
2	To get exposure to students on machine learning					K2
3	To understand the basics of supervised learning and Unsupervised Learning					K3
4	Students will apply AI & ML algorithms to solve the problems of complexity					K4
5	To get a job in the AL & ML domain					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I	AI & ML Tools				6 HOURS	
Experiments on Python and other AI Tool						
UNIT:II	Searching, Feature Extraction, and Selection				6 HOURS	
Experiments on Searching, Feature Extraction, and Selection						
UNIT:III	Probabilistic Reasoning, Classification & Regression				6 HOURS	
Experiment on Probabilistic Reasoning, classification and Regression						
UNIT:IV	Development of ML Model				6 HOURS	
Experiment to develop ML Model						
UNIT:V	Reinforced and Deep Learning				6 HOURS	
Experiment on Reinforcement and Deep Learning						
UNIT:VI	CONTEMPORARY ISSUES				2 HOURS	
Assignment, Seminar, case studies on the latest Topics and current trends						
TOTAL LECTURER HOURS					32 HOURS	

Text Book(s)	
1	Deisenroth, Faisal, Ong, Mathematics for Machine Learning, Cambridge University Press, 2020.
2	B Joshi, Machine Learning and Artificial Intelligence, Springer, 2020.
3	Parag Kulkarni and Prachi Joshi, “Artificial Intelligence – Building Intelligent Systems”, PHI learning Pvt. Ltd., ISBN – 978-81-203-5046-5, 2015
4	Stuart Russell and Peter Norvig (1995), “Artificial Intelligence: A Modern Approach,” Third edition, Pearson, 2003.
Reference Book(s)	
1	Solanki, Kumar, Nayyar, Emerging Trends and Applications of Machine Learning, IGI Global, 2018.
2	Mohri, Rostamizdeh, Talwalkar, Foundations of Machine Learning, MIT Press, 2018.
3	Kumar, Zindani, Davim, Artificial Intelligence in Mechanical and Industrial Engineering, CRC Press, 2021.
4	Zsolt Nagy - Artificial Intelligence and Machine Learning Fundamentals-Apress (2018)
5	Artificial Intelligence by Elaine Rich, Kevin Knight and Nair, TMH
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	http://nptel.ac.in/courses/111101003/
2	https://nptel.ac.in/courses/106/106/106106202/
3	https://nptel.ac.in/courses/112/103/112103280/
4	https://www.analyticsvidhya.com/
Course Designed By: Dr.T. RAMESH	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	S	M	S	M
CO2	S	S	S	S	M	S	M	L	S	L
CO3	M	M	L	L	L	M	L	M	M	M
CO4	M	S	M	L	S	S	M	L	L	S
CO5	M	S	S	M	M	L	S	M	M	L

*S-Strong; M-Medium; L-Low

Course code	25IT43A	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
Core/Elective/Supportive		Core	3	1	-	4
Pre-requisite		Basics about Networking, TCP/IP and Programming Skills	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. To understand the User Interface Design, Back-end databases, and other services for mobile applications.						
2. To get a job using mobile application development skills						
3. To get exposure to the Android and IOS development environment						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Understand the principles of Mobile networks					K2
2	Understand the different mobile network technologies					K2
3	Get familiar with the Android and IOS environment					K3
4	Design and develop a Mobile application using Android and IOS.					K6
5	Get a job with their own skills.					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
Flutter Framework and Dart Programming I			10 HOURS			
Introduction to Flutter : Features - Advantages – Disadvantages - Architecture of Flutter Applications - Widgets - Gestures ; Introduction to Dart Programming : Variables and Data types - Decision Making and Loops - Functions - Object Oriented Programming – Exception Handling						
UNIT:II						
Dart Programming II			14 HOURS			
Introduction to Layouts : Asynchronous Programming - Futures, Async, Await, Streams - Type of Layout Widgets - Single Child Widgets - Multiple Child Widgets - Advanced Layout Application - Introduction to Gestures - Statement Management in Flutter - Ephemeral State Management - Application State - scoped model - Navigation and Routing; UI development : Styles and assets - fonts - Model API - Media query; Animation on Flutter - Introduction to Animation Based Classes - Work flow of the Flutter Animation - Working Application						
UNIT:III						
Kotlin - Screen Design and Data Management			12 HOURS			
Android Foundation - Creating an Android project with Android Studio - Setting up a virtual device and running your app - The Android manifest - Using Cradle to build, configure, and manage app dependencies – project and app level build cradle file - Android application structure - Accessing Views in layout files Activity lifecycle - Saving and restoring the Activity state - Activity interaction with Intents - Intents, Tasks, and Launch Modes; Developing the UI with Fragments : The fragment lifecycle - Static fragments and dual-pane layouts; Dynamic fragments -						

Jetpack Navigation - Building App Navigation - Android Architecture Components – ViewModel - Data streams – LiveData - Additional data streams – Room – Entities – DAO		
UNIT:IV	Kotlin : Networking in Android	10 HOURS
Android Essential Libraries: Retrofit, Moshi, and Glide -Introducing REST, API, JSON, and XML - Fetching data from a network endpoint - Parsing a JSON response - Loading images from a remote URL - Adding and Interacting with RecyclerView - Android Permissions and Google Maps - Services, WorkManager, and Notifications - Building User Interfaces Using Jetpack Compose		
UNIT:V	Kotlin : Testing, Code Structure, and Polishing	14 HOURS
Testing : Unit Tests and Integration Tests with JUnit, Mockito, and Espresso – Robolectric – Espresso - UI tests - Testing in Jetpack Compose – TDD; Persisting Data : Preferences and DataStore – SharedPreferences – DataStore – Files - Internal storage - External storage – FileProvider - The Storage Access Framework (SAF) - Asset files - Scoped storage - Camera and media storage - Dependency Injection with Dagger, Hilt, and Kotlin - C - Routines and Flow; Architecture Patterns – MVVM - Using Retrofit and Moshi - Using WorkManager; Animations and Transitions - CoordinatorLayout and MotionLayout - creating a keystore in Android Studio; Android app bundle - Creating a developer accountActivity transitions - Adding activity transitions through XML - Launching Your App on Google Play.		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Assignment Seminar, Case studies, Mini Projects, etc...		
TOTAL LECTURE HOURS		62 HOURS
Text Book(s)		
1	Booker Blunt, App Development with Flutter Build Cross Platform Apps: A Step-by-Step Guide to Mastering Mobile App Development with Flutter, Independently Published, 2025	
2	Alex Forrester, Eran Boudjnah, Alexandru Dumbravan, Jomar Tigcal, How to Build Android Apps with Kotlin: A practical guide to developing, testing, and publishing your first Android apps, Packt Publishing Limited, 2023	
3	Pankaj Kumar, Building Android Projects with Kotlin, 2022	
4	Hardik Trivedi, Android Application Development With Kotlin, 2020	
Reference Books		
1	John Horton, Android Programming with Kotlin for Beginners: Build Android apps starting from zero programming experience with the new Kotlin programming language. Packt Publishing,2019	
2	Alessandro Biessek, Flutter for Beginners: An introductory guide to building cross-platform mobile applications with Flutter and Dart 2, Packt Publishing Limited, 2019	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://docs.flutter.dev/get-started/fundamentals/dart
2	https://developer.android.com/guide/topics/resources
3	https://www.ibm.com/think/topics/android-development
4	https://kotlinlang.org/docs
5	https://developer.android.com/kotlin
Course Designed By: Dr. T.RAMESH.	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong;

M-Medium;

L-Low

Course code	25IT43B	MODERN JAVASCRIPT	L	T	P	C
Core/Elective/Supportive		Core	3	1	-	4
Pre-requisite		Familiar with HTML, CSS, and JavaScript	Syllabus Version		2025-26	
Course Outcomes (COs)						
After the completion of this course, the students will be able to:						
1	Understand the MVC Architecture					
2	Understand the User Interface Design					
3	Familiar on AngularJS, ReactJs, ExpressJs, Bootstrap, and Tailwind					
Expected Course Outcome:						
On the successful completion of the course, student will be able to:						
1	Understand the basic concept on Modern Java Scripts					K1,K2
2	Design their own user interface design					K3,K4
3	Differentiate different scripting and their specific need					K3
4	Design and develop their own software					K5
5	Get the jobs and work as a freelancer					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit : I	AngularJS				12 HOURS	
AngularJS : Introduction - Features - MVC Architecture - Anatomy - Expressions - Object Binding - Data Binding – Arrays - Modules - Controllers – Scope & Events - Forms And Filters – Directives – Multiple Views And Routing – Services - Animation						
Unit : II	ReactJS				12 HOURS	
ReactJS: Basics - JSX syntax – advantages - Components, Props, and State - reusable components - Understanding props and state - Component lifecycle -Conditional Rendering and Event Handling - Rendering components conditionally - Handling events in React - State updates and re-renders - React States and Hooks- Managing state - Advanced React Hooks- Effect hook for side effects - state management - Custom Hooks-React Routing - Router-Implementing client-side routing - Navigating between components						

Unit : III	Node.JS	12 HOURS
Node.js : Introduction - Setting Environment - Installing Node.js and npm - Creating Server - Handling HTTP requests and responses - Express JS - Configuring Routes - Express - Asynchronous JavaScript - Callbacks and Promises - async-File System – File Operations - Writing a file asynchronously - Other I/O Operations		
UNIT: IV	EXPRESS.JS and RESTful API	12 HOURS
Express.JS : Introduction - Basic Routing – Middleware - Templating Engines - Working with Databases – Integration - CRUD Operations RESTful APIs : Design Principles - Implementation - HTTP methods and status codes - Express Middleware - Error Handling – Security - Authentication & Authorization - Session Management - Deployment - various platforms (e.g., Heroku, AWS, DigitalOcean) - Real-time Communication - Designing and implementing API routes - Integrating MongoDB with Mongoose - Testing APIs with Postman - - Database Connectivity - Connecting String –SQL operations		
UNIT: V	Bootstrap and Tailwind CSS	12 HOURS
Bootstrap : Introduction to CSS Frameworks – benefits – Bootstrap Installation, CDN, local setup - Grid System – Components – Customization - JavaScript integration Tailwind CSS : Basics - Installation (CLI, PostCSS) & configuration – Layout (Flexbox, Grid, Spacing) - Typography (Font sizes, weights, colors) - Colors, Backgrounds, Borders - Responsive design (Breakpoints, responsive utilities) - Interactivity (Hover, Focus, Active states) – Customization - Responsive Design - Dark Mode - Using plugins like Prettier and IntelliSense - Optimizing CSS delivery - Accessibility- Integration with JavaScript frameworks/Libraries – Deployment		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Seminar, Expert Lecturer, Assignments		
TOTAL LECTURE HOURS		62 HOURS
Text Book(s)		
1	Sandeep Panda, “AngularJS: Novice to Ninja: Elegant, Powerful, Testable, Extendable ”, Site Point, 2014.	
2	Ivaylo Gerchev, Tailwind CSS, O’Reilly, 2022	
3	Jacob Lett, Bootstrap 4 Quick Start: Responsive Web Design and Development Basics for Beginners, Bootstrap Creative, 2018	
4	Ethan Brown, Web Development with Node and Express, Orielly, 2019	
5	Ari Lerner, Ng-Book: The Complete Book on Angularjs, Lightning Source Inc; 1 edition.	

Reference Book(s)	
1	Greg Lim, Beginning Node.js, Express & MongoDB Development, Greg Lim, 2020
2	Brad Green and Shyam Seshadri, “AngularJS – Up and Running”, O'Reilly, 2014
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialsteacher.com/angularjs/angularjs-validation-css-classes .
2	https://docs.angularjs.org/tutorial
3	https://reactjs.org/docs/thinking-in-react.html
Course Designed By: Dr.T.Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong;

M-Medium;

L-Low

Course code	25IT43P	MOBILE APPLICATION DEVELOPMENT - LAB	L	T	P	C
Core/Elective/Supportive		Core	-	-	2	2
Pre-requisite		Basics about Networking, TCP/IP and Programming Skills		Syllabus Version	2025-26	
Course Objectives:						
The main objectives of this course are to: 1. To understand the User Interface Design, Back-end databases, and other services for mobile applications. 2. To get a job using mobile application development skills 3. To get exposure to the Android and IOS development environment						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Understand the principles of Mobile networks				K2	
2	Understand the different mobile network technologies				K2	
3	Get familiar with the Android and IOS environment				K3	
4	Design and develop a Mobile application using Android and IOS.				K6	
5	Get a job with their own skills.				K6	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
		Flutter Framework		6 HOURS		
Exercises on Flutter Framework						
UNIT:II						
		Dart Programming		6 HOURS		
Exercises on Dart Programming						
UNIT:III						
		Kotlin - Screen Design and Data Management		6 HOURS		
Exercises on Kotlin Screen Design and Data Management						
UNIT:IV						
		Kotlin : Networking in Android		6 HOURS		
Exercises on Kotlin Networking, JSON etc.						
UNIT:V						
		Kotlin : Testing, Code Structure, and Polishing		6 HOURS		
Exercises on Testing, Animation using Kotlin						
UNIT : VI						
		CONTEMPORARY ISSUES		2 HOURS		
Mini Projects						
TOTAL LECTURE HOURS				32 HOURS		

Text Book(s)	
1	Booker Blunt, App Development with Flutter Build Cross Platform Apps: A Step-by-Step Guide to Mastering Mobile App Development with Flutter, Independently Published, 2025
2	Alex Forrester, Eran Boudjnah, Alexandru Dumbravan, Jomar Tigcal, How to Build Android Apps with Kotlin: A practical guide to developing, testing, and publishing your first Android apps, Packt Publishing Limited, 2023
3	Pankaj Kumar, Building Android Projects with Kotlin, 2022
4	Hardik Trivedi, Android Application Development With Kotlin, 2020
Reference Books	
1	John Horton, Android Programming with Kotlin for Beginners: Build Android apps starting from zero programming experience with the new Kotlin programming language. Packt Publishing, 2019
2	Alessandro Biessek, Flutter for Beginners: An introductory guide to building cross-platform mobile applications with Flutter and Dart 2, Packt Publishing Limited, 2019
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://docs.flutter.dev/get-started/fundamentals/dart
2	https://developer.android.com/guide/topics/resources
3	https://www.ibm.com/think/topics/android-development
4	https://kotlinlang.org/docs
5	https://developer.android.com/kotlin
Course Designed By: Dr. T.RAMESH.	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong;

M-Medium;

L-Low

Course code	25IT43Q	MODERN JAVASCRIPT- LAB	L	T	P	C
Core/Elective/Supportive		Core	-	-	2	2
Pre-requisite		Familiar with HTML, CSS, and JavaScript programming	Syllabus Version		2025-26	
Course Outcomes (COs)						
After the completion of this course, the students will be able to:						
1	Understand the MVC Architecture					
2	Understand the User Interface Design					
3	Familiar on AngularJS, ReactJs, ExpressJs, Bootstrap, and Tailwind					
Expected Course Outcome:						
On the successful completion of the course, student will be able to:						
1	Understand the basic concept on Modern Java Scripts				K1,K2	
2	Design their own user interface design				K3,K4	
3	Differentiate different scripting and their specific need				K3	
4	Design and develop their own software				K5	
5	Get the jobs and work as a freelancer				K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit : I		AngularJS	6 HOURS			
Experiment on AngularJS						
Unit : II		ReactJS	6 HOURS			
Experiment on ReactJS						
Unit : III		Node.JS	6 HOURS			
Experiment on NodeJS						
UNIT: IV		EXPRESS.JS and RESTful API	6 HOURS			
Experiment on ExpressJS and RestfulJS						
UNIT: V		Bootstrap and Tailwind CSS	6 HOURS			
Experiment on Bootstrap and Tailwind CSS						
UNIT : VI		CONTEMPORARY ISSUES	2 HOURS			
Case studies						
TOTAL LECTURE HOURS			32 HOURS			

Text Book(s)	
1	Sandeep Panda, “AngularJS: Novice to Ninja: Elegant, Powerful, Testable, Extendable ”, Site Point, 2014.
2	Ivaylo Gerchev, Tailwind CSS, O’Reilly, 2022
3	Jacob Lett, Bootstrap 4 Quick Start: Responsive Web Design and Development Basics for Beginners, Bootstrap Creative, 2018
4	Ethan Brown, Web Development with Node and Express, Orielly, 2019
5	Ari Lerner, Ng-Book: The Complete Book on Angularjs, Lightning Source Inc; 1 edition.
Reference Book(s)	
1	Greg Lim, Beginning Node.js, Express & MongoDB Development, Greg Lim, 2020
2	Brad Green and Shyam Seshadri, “AngularJS – Up and Running”, O’Reilly, 2014
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialsteacher.com/angularjs/angularjs-validation-css-classes .
2	https://docs.angularjs.org/tutorial
3	https://reactjs.org/docs/thinking-in-react.html
Course Designed By: Dr.T. Ramesh.	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	S	S	S	M	S	M	S
CO3	L	S	L	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	M	S	M	M
CO4	L	M	M	M	S	S	M	S	M	M
CO5	L	M	M	M	S	S	M	S	M	M

*S-Strong;

M-Medium;

L-Low

Course code	25ITXEA	ADVANCED DATA BASE MANAGEMENT SYSTEMS	L	T	P	C
Core/Elective/Supportive		Elective	3	1	-	4
Pre-requisite		UG level – Database management system	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. This course aims at facilitating the student to understand the various functionalities of DBMS software.						
2. It helps to perform many operations related to creating, manipulating and maintaining databases for Real-world applications						
3. It helps the students to understand the various designing concepts, storage methods, querying and managing databases.						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Explain the structure and model of the relational database system					K2
2	Design multiple tables, and using group functions, sub queries					K3
3	Design a database based on a data model considering the normalization to a specified level					K4
4	Estimate the storage size of the database and design appropriate storage techniques					K3
5	Analyze the requirements of transaction processing, concurrency control					K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
Introduction			9 HOURS			
Database Design and the E-R Model: The Entity-Relationship Model, Entity-Relationship Diagrams, Normalization: Introduction, Nonloss Decomposition and Functional Dependencies, 1NF, 2NF and 3NF, Boyce/ Codd Normal Form. Parallel Databases: I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism.						
UNIT:II						
Object-Based Distributed and Databases			9 HOURS			
Distributed Databases: Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing. Object-Based Databases: Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multiset, Object Identity and Reference Types, Object Oriented versus Object Relational.						
UNIT:III						
XML			9 HOURS			
XML: Structure of XML Data, XML Document Schema - Document Type Definition (DTD) - XML Schema, XML Querying and Transformation - Tree Model of XML – Xpath – Xquery, Application Program Interfaces to XML, Storage of XML Data - Nonrelational Data Stores - Relational Databases - SQL/XML, XML Applications - Storing Data with Complex Structure - Standardized Data Exchange Formats - Web Services - Data Mediation.						

UNIT:IV	Spatial and Temporal Data and Mobility	9 HOURS
Time in Databases - Time Specification in SQL - Temporal Query Languages, Spatial and Geographic Data - Representation of Geometric Information - Design Databases - Geographic Data - Spatial Queries - Indexing of Spatial Data, Multimedia Databases - Multimedia Data Formats - Continuous-Media Data - Similarity-Based Retrieval, Mobility and Personal Databases - A Model of Mobile Computing - Routing and Query Processing - Broadcast Data Disconnectivity and Consistency.		
UNIT:V	NoSQL	9 HOURS
NoSQL Basics - Definition and Introduction - Sorted Ordered Column-Oriented Stores - Key/Value Stores - Document Databases - Graph Databases - Interfacing and Interacting with NoSQL - Language Bindings for NoSQL Data Stores – Storage Architecture- HBase Distributed Storage Architecture - NoSQL in Cloud - Google App Engine Data Store- Amazon SimpleDB – Case Study in MongoDB.		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars– webinars Latest developments/topics in Advanced DBMS		
	TOTAL LECTURE HOURS	47 HOURS
Text Book(s)		
1	Silberschatz, Korth, Sudarshan, “Database system concepts”, 6th Edition, Tata McGraw Hill (For UNITS I, IV), 2011.	
2	C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, 8th Edition, Pearson Education Reprint 2016.	
3	Shashank Tiwari, “Professional NoSQL” (For UNIT V), 2011.	
Reference Books		
1	Ramez Elmasri, Shamkant B. Navathe,“Fundamentals of Database Systems”, 6th Edition, Addison-Wesley.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Database Management SystemBy Dr. B. Lavanya, Associate Professor, University of Madras, Chennai, Tamil Nadu, Duration : 12 weeks	
Course Designed By:Dr.W.ROSEVARUNA		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	L	M	S	S
CO3	S	S	S	S	S	S	L	M	M	S
CO3	M	M	M	S	S	L	L	L	M	M
CO4	L	L	S	S	S	L	L	M	S	M
CO5	M	M	S	S	S	M	L	L	S	S

*S-Strong; M-Medium; L-Low

Course Code	25ITXEC	GRAPHICS AND MULTIMEDIA SYSTEMS	L	T	P	C
Core/Elective/Supportive		Elective	2	1	-	3
Pre-requisite		Introduction to Computer Graphics and Multimedia	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. To give a brief understanding of computer graphics and input-output devices.						
2. To enable students to know about 2-D and 3-D geometrical transformation.						
3. To describe the ways in which multimedia information is captured, processed, and rendered.						
4. To introduce various new multimedia images file formats such as TIFF and JFIF.						
5. To learn the step-by-step process of how to develop non-computer and computer-based animations.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Describe technical characteristics and performance of multimedia systems and terminals.					K2
2	Design creative approach in the application of multimedia devices, equipment, and systems.					K6
3	Carry out experiments and measurements on the multimedia systems in laboratory conditions on real components and equipment.					K3
4	Interpret and analyze measurement results obtained on the multimedia system and components.					K4
5	Understand all file formats.					
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6– Create						
Unit: I		INTRODUCTION TO COMPUTER GRAPHICS			9 HOURS	
Introduction to Computer Graphics: Applications of Computer Graphics, Operations of Computer Graphics, Graphics Software Packages, Requirements, Graphical User Interface. Graphical I/O Devices: Raster Video Principals, Random Scan Devices, Graphics Accelerators, and Graphics Co-Processors. Scan Conversion: Methods, Polynomial Method, DDA Algorithms, Bresenhams Algorithms.						
Unit: II		TRANSFORMATIONS			9 HOURS	
2-DGeometrical Transformations: Basic Transformations, Homogeneous Coordinate Systems, Other Transformations, Combined Transformations, Inverse of Combined Transformations, 3-D Geometrical Transformations: Basic 3-D Transformations, 3-D Translation. Scaling, Rotation, Rotation about an Arbitrary Axis in Space, Other 3-D transformations, 3-D Reflection, Reflection about any Arbitrary Plane, 3-D Shearing.						

Unit: III	INTRODUCTION TO MULTIMEDIA	9 HOURS
Introduction to Multimedia: Concepts of Multimedia, Types, Multimedia data Streams, hardware/Software Requirements, Applications, Multimedia Authoring, Digital Audio, MIDI, Image Compression Standards, Video Compression and Encoding, Hypertext and Hypermedia.		
Unit: IV	FILE FORMATS	9 HOURS
Graphics Image File Formats: Image File Formats, Raster Formats, Bitmap Format, Graphics Interchange Format, Joint Photographic Experts Group, Tagged Image File Format, Microsoft Image Extensions, Portable Network Graphics, BMP Format, Overview, Bitmap Compression, JPEG and JFIF, JPEG Encoding Steps, JFIF Format, GIF Format, GIF Extension Blocks, TIFF File Formats.		
Unit: V	TOOLS FOR WORLD WIDE WEB	9 HOURS
Multimedia Tools in the Information Commons, Audio, Video, Photo, Text Scanning, and OCR, Font Editing and Design Tools, Text Editing and Word Processing Tool, Image Editing Tool, Painting, and Drawing Tools, Sound Editing Tool, Digitized Audio, MIDI, Comparison between MIDI and Digitized Audio, Advantages and Disadvantages of Digitized Audio and MIDI, Animation, Video, and Digital Movie Tool, Video Formats.		
Unit: VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars		
TOTAL LECTURE HOURS		47 HOURS
Text Book(s)		
1	Fundamentals of Computer Graphics, International Student Edition, Steve (Cornell University Marschner, Ithaca New York USA), Peter Shirley · 2022, Taylor and Francis Limited Publication	
2	Computer Graphics And Multimedia (Hb 2022) by Moody L, Kaufman Press	
3	Multimedia Computing, By Gerald Friedland, Ramesh Jain · 2014, Cambridge University Press	
4	Computer Graphics- Theory and Practice By Jonas Gomes, Luiz Velho, Mario COsta Sousa · 2012, CRC Press	
Reference Book(s)		
1	Fundamentals of Computer Graphics By Steve Marschner, Peter Shirley, Michael Ashikhmin, Michael Gleicher, Naty Hoffman, Garrett Johnson, Peter Willemsen, Tamara Munzner, Erik Reinhard, William B. Thompson, Brian Wyvill · 2021, CRC Press/Taylor & Francis Group publication	
2	Malay K. Pakhira, “Computer Graphics, Multimedia Animation”, PHI Learning, 2010.	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	Introduction to Computer Graphics, Dr.Prem Kalra, Department of CSE, IIT.
2	https://www.youtube.com/watch?v=6LjVtIcSbK8&list=PLwdnzlV3ogoWaYiowRtJ8t8FeR-ODfSV1
3	https://www.youtube.com/watch?v=fwzYuhduME4&list=PL338D19C40D6D1732
4	https://www.youtube.com/watch?v=V4mP2pQyou0&list=PL112A527F83F7A5E4 https://www.youtube.com/watch?v=davcYvCJ63w
5	https://www.youtube.com/watch?v=fAJzLuce_ms
Course Designed By: Dr.R.VADIVEL	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	L
CO3	S	S	M	S	S	S	S	S	S	S
CO4	L	M	L	L	S	M	S	S	S	S
CO5	M	L	M	S	L	S	S	S	L	M

*S-Strong; M-Medium; L-Low

Course Code	25ITXEE	ADVANCED JAVA PROGRAMMING	L	T	P	C
Core/ Elective/ Supportive		Elective	2	1		3
Pre-requisite		UG-Degree Level: Basic Java, OOPs Concepts, Applet	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. To deepen student’s programming skills by analyzing the real world problem in a programmer’s point of view and implement the concepts in real time projects						
2. To enable the students to learn the ethical, historical, environmental and technological aspects of Advanced Java Programming and how it impacts the social and economic development of society						
3. To get a job in in the industry						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Describes about the basic object oriented concepts like encapsulation, polymorphism and various AWT concepts.					K2/ K3
2	Able to develop a Graphical User Interface (GUI) with Applet and Swing					K2/K3/K4
3	Develop a Client-Server Application with Database Maintenance					K5/K6
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6– Create						
UNIT: I		Design Patterns			9 HOURS	
Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern- Proxy Pattern- Decorator Pattern- Command Pattern- Template Pattern- Mediator Pattern-Collection Framework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class- Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class- Linked Hash Map class –Tree Map class - Comparable interface -Comparator interface-Comparable vs. Comparator						
UNIT: II		Applet Fundamentals and AWT Components			9 HOURS	
Applet Fundamentals- Applet Class - Applet lifecycle- Steps for Developing Applet Programs- Passing Values through Parameters- Graphics in Applets- GUI Application - Dialog Boxes - Creating Windows - Layout Managers – AWT Component classes – Swing component classes- Borders – Event handling with AWT components - AWT Graphics classes - File Choosers - Color Choosers – Tree – Table – Tabbed panels–Progressive bar - Sliders.						
UNIT: III		JDBD Connection			9 HOURS	
JDBC -Introduction - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and Inet address classes.						
UNIT: IV		JSP and Servlet			9 HOURS	
Servlet: Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – Generic Servlet, Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies- JSP Engines - Working with JSP - JSP and Servlet - Anatomy of a JSP Page- Database Connectivity using Servlets and JSP.						

UNIT: V		Lambda Expressions	9 HOURS
Lambda Expressions- Method Reference- Functional Interface- Streams API, Filters- Optional Class- Nashorn- Base 64 Encode Decode- JShell(RPEL)- Collection Factory Methods- Private Interface Methods- Inner Class Diamond Operator- Multiresolution Image API.			
UNIT: VI		CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars Latest Development / Topics in Advanced Java Programming			
		TOTAL LECTURE HOURS	47 HOURS
Text Book(s)			
1	Java: The Complete Reference, Twelfth EditionBy HerbertSchildt · 2021 McGraw-HillEducation		
2	Programming with Java By E Balagurusamy · 2019, McGraw-Hill Education		
3	Java ProjectsLearn the Fundamentals of Java 11 Programming by Building Industry Grade Practical Projects, 2nd EditionBy Peter Verhas · 2018		
4	Advanced Java, By Anuradha A. Puntambekar · 2020, UNICORN Publishing Group		
5	Warburton Richard, “Java 8 Lambdas”, Shroff Publishers & Distributors Pvt Ltd.		
Reference Book(s)			
1	Java How To Program, By Paul Deitel, Harvey Deitel · 2019, Pearson Education		
2	Jan Graba, “An Introduction to Network Programming with Java 7 Compatible”, 3rd Edition, Springer.		
Related Online Contents [MOOK, SWAYAM, NPTEL, Websites etc.]			
1	https://nptel.ac.in/courses/106.105.106105191/		
2	https://www.digimat.in/courses/video/106105191/L01.html		
3	https://nptel.ac.in/noc/courses/noc20SEMI/noc20-cs08/		
4	https://www.youtube.com/watch/vkpSUw_FTg4		
5	https://www.youtube.com/watch/vVksxhztD8kQ		
6	https://swayam.gov.in/nd1_noc19_cs84/preview		
Course Designed By: Dr.R.VADIVEL			

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	L
CO3	S	S	M	S	S	S	S	S	S	S
CO4	L	M	L	L	S	M	S	S	S	S
CO5	M	L	M	S	L	S	S	S	L	M

*S-Strong; M-Medium; L-Low

Course code	25ITXEG	EXTENDED REALITY	L	T	P	C
Core/Elective/Supportive		Elective	2	1	-	3
Pre-requisite		Introduction to Computer Graphics and Image Processing	Syllabus version		2025-26	
Course objectives						
1. To provide a foundation for the fast-growing field of AR, and VR						
2. To make the students aware of the various AR, and VR devices.						
3. To get exposure to AR, VR concepts						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Define how AR and VR systems work and list the applications of AR and VR					K1
2	Understand and evaluates the hardware requirements of AR and VR					K2
3	Use computer vision concepts for AR and VR describe AR, and VR techniques					K3
4	Analyse and understand the working of various state of the art AR, and VR devices					K4
5	Gain knowledge of mixed reality					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I		Computer Graphics and Geometric Modelling	9 HOURS			
The Virtual world space, positioning the virtual observer, the perspective projection, human vision - stereo perspective projection, Color theory, Conversion From 2D to 3D, 3D space curves, 3D - boundary representation, Simple 3D modelling, 3D clipping, Illumination models, Reflection - models, Shading algorithms, Geometrical Transformations: Introduction, Frames of reference - Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection - Geometric modelling, Kinematics modelling, Physical modelling, Behaviour modelling, Model –management						
UNIT:II		Virtual Reality(VR) and Development Tools	9 HOURS			
Human factors: Introduction, the eye, the ear, the somatic senses- Human Physiology and Perception. Audio : Physics of Sound - The Physiology of Human Hearing - Auditory Perception – Auditory; Introduction to Virtual Reality (VR) : Virtual Reality and Virtual Environment- Computer graphics, Benefits - Historical development of VR; Input Devices: Tracker, Sensor, Digital Gloves, Movement Capture, Video based Input, 3D Menus & 3D Scanner, Gesture Interface etc., - Three-dimensional position trackers - navigation and manipulation - interfaces and gesture interfaces; Output Devices : Visual – Auditory - Haptic Devices- Graphics displays-sound displays & haptic feedback - Head-coupled displays, Acoustic hardware, - Integrated VR systems; Software: Introduction, Modelling virtual world, Physical simulation, VR toolkits, Introduction to VRML						

UNIT:III	Virtual Environment	9 HOURS
Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems; Animating the Virtual Environment: Introduction, The dynamics of numbers, Linear and Nonlinear interpolation, the animation of objects, linear and non-linear translation, shape & object in between, free from deformation, particle system; Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels, Elastic collisions, projectiles, simple pendulum, springs, Flight dynamics of an aircraft		
UNIT:IV	Augmented Reality (AR):	9 HOURS
Augmented Reality (AR): Taxonomy, Technology and Features of Augmented Reality, AR Vs - VR, Challenges with AR, AR systems and functionality, Augmented Reality Methods, - Visualization Techniques for Augmented Reality, Enhancing interactivity in AR Environments, - Evaluating AR systems; Augmented Reality Display Hardware: Audio Displays, Haptic Displays, Visual Displays, Other sensory displays, Visual Perception, Requirements and Characteristics, Spatial Display Model.; Augmented Reality Processors: -Role of Processors, Processor System Architecture, Processor Specifications; Tracking & Sensors: Tracking, Calibration, and Registration, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors, Optical Tracking, Sensor Fusion.		
UNIT:V	Augmented Reality Software	9 HOURS
Introduction, Major Software Components for Augmented Reality Systems, Software used to Create Content for the Augmented Reality Application - Camera parameters and camera calibration, Computer Vision for Augmented Reality - Marker-based augmented reality, AR Toolkit; Modeling Annotation and Authoring : Modeling annotation-specifying geometry-appearance-semi-automatic reconstruction-freeform modeling-annotation. Authoring requirements of AR, Authoring elements of authoring, and Stand-alone authoring solutions. Navigation-human navigation-exploring and discovery -route visualization viewpoint point guidance-multiple perspective.		
UNIT: VI	CONTEMPORARY ISSUES	2 HOURS
Assignment, Seminar, Practical, and exploring different modern tools available on market		
TOTAL LECTURER HOURS		47 HOURS

Text Books :	
1	Rajesh K. Maurya, Computer Graphics with Virtual Reality System, 3rd Edition, Wiley Publication, 2018.
2	Schmalstieg, D., Höllerer, T., “Augmented Reality: Principles & Practice,” Pearson, 2016
3	Norman, K., Kirakowski, J., “Wiley Handbook of Human Computer Interaction,” Wiley-Blackwell, 2018
4	LaViola Jr., J. J., Kruijff, E., McMahan, R. P., Bowman, D. A., Poupyrev, I., “3D User Interfaces: Theory and Practice,” Pearson, 2017
5	Fowler, A., “Beginning iOS AR Game Development: Developing Augmented Reality Apps with Unity and C#,” Apress, 2019
6	Hassanien, A. E., Gupta, D., Khanna, A., Slowik, A., “Virtual and Augmented Reality for Automobile Industry: Innovation Vision and Applications,” Springer, 2019
Reference Books :	
1	William R. Sherman and Alan B. Craig, Understanding Virtual Reality Interface, Application, and Design, 2nd Edition, Morgan Kaufmann Publishers, Elsevier, 2019.
2	Grigore C. Burdea, Philippe Coiffet, Virtual Reality Technology, 2nd Edition, Wiley, 2017.
3	K.S. Hale and K. M. Stanney, Handbook on Virtual Environments, 2nd Edition, CRC Press, 2017
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	http://vr.cs.uiuc.edu/vrbook.pdf
2	https://nptel.ac.in/courses/106/106/106106138/
Course Designed by Dr. T. Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	S	M	S	M
CO2	S	S	S	S	M	S	M	L	S	L
CO3	M	M	L	L	L	M	L	M	M	M
CO4	M	S	M	L	S	S	M	L	L	S
CO5	M	S	S	M	M	L	S	M	M	L

*S-Strong; M-Medium; L-Low

Course code	25ITXEI	INDUSTRIAL AUTOMATION AND ROBOTICS	L	T	P	C
Core/Elective/Supportive	Elective		2	1	-	3
Pre-requisite	Basics about the Automation		Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. Understand the functional elements of Robotics						
2. Acquire the knowledge of direct and inverse kinematics						
3. Explore the different motion and controls						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Ability to understand basic concept of robotics.					K2
2	Analyze Instrumentation systems and their various applications.					K3
3	Know about the differential motion add statics in robotics					K4
4	Know about the various path planning techniques.					K5
5	Know about the dynamics and control in robotics industries					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I	Introduction to Robotics and Industrial Robotics				9 HOURS	
Introduction to Robotics - history -Types of Robot–Technology-Robot classifications and specifications-Design and control issues - Various manipulators – Sensors - work cell - Programming languages - robot configurations - robot anatomy, joint system, types of joints, work volume, robot drive systems, precision of movement						
UNIT:II	Direct and Inverse Kinematics				9 HOURS	
Mathematical representation of Robots - Position and orientation - transformation of rigid body – Homogeneous transformation - Representation using the Denavit-Hartenberg parameters -Degrees of freedom- SCARA robots- Solvability – Solution methods-Closed form solution - Direct kinematics - manipulator kinematics, d-h parameters, 2r and 3r mechanism d-h analysis, forward and inverse kinematics.						
UNIT:III	Robot Actuators, Feed Back Components And Manipulator Differential Motion				9 HOURS	
Actuators- pneumatic-hydraulic actuators, electric & stepper motors, comparison, position sensors – potentiometers- resolvers- encoders – velocity sensors-tactile sensors proximity sensors, robot applications in manufacturing - Linear and angular velocities-Manipulator Jacobian-Prismatic and rotary joints–Inverse -Wrist and arm singularity - Static analysis - Force and moment Balance.						
UNIT:IV	Path Planning, Dynamics and Control				9 HOURS	
Definition -Joint space technique-Use of p-degree polynomial-Cubic polynomial-Cartesian space technique - Parametric descriptions - Straight line and circular paths - Position and orientation planning - Lagrangian mechanics-2DOF Manipulator-Lagrange Euler Formulation-Dynamic model – Manipulator control problem-Linear control schemes-PID control scheme-Force control of robotic manipulator.						

UNIT:V	Applications of Robots in Manufacturing	9 HOURS
Material Transfer - Material handling, loading and unloading - Process spot and continuous arc welding & spray painting – Assembly and Inspection. Pick and place Robot, Application of Robots in Arc Welding, Robots, Assembly and mega assembly Robots, continuous arc welding, Spot welding, Spray painting, assembly operation-Coating, Deburring, cleaning, Die Casting, Molding, Picking, Palletizing, Packaging		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Assignment, Seminar and Case Studies		
	TOTAL LECTURE HOURS	47 HOURS
Text Book(s)		
1	Mikell P. Groover, Automation, Production Systems and CIM, Prentice-Hall of India Pvt. Ltd, 2016.	
2	Nicholas Odrey, Mitchell Weiss, Mikell Groover, Roger Nagel, Ashish Dutta, Industrial Robotics - Technology, Programming and Applications (SIE), , McGraw-Hill 2nd Edition, 2017.	
3.	Niku, S. B, John, Introduction to Robotics: Analysis, Control and Applications. Wiley & Sons, 2020.	
4.	R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2017	
Reference Books		
1	K.S.Fu., R.C.Gonzalez, C.S.G. Lee, Robotics: Control Sensing, Vision and Intelligence Indian Edition, McGraw Hill Book Co., 2008.	
2	Coiffet, P., & Chirouze, M, An introduction to robot technology, Springer Science & Business Media, 2012.	
3.	Mittal R.K & Nagrath IJ, Robotics and Control, , McGraw-Hill, 2017.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.automationanywhere.com › rpa › robotic-pr...	
2	http://www.https://ifr.org/	
Course Designed by : Dr.T.Ramesh		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITXEK	DATA SCIENCE AND DATA ANALYTICS	L	T	P	C
Core/Elective/Supportive		Elective	2	1	-	3
Pre-requisite		UG level – Data Mining , Data Structure, and statistics	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to: 1. Understand the Concept Data Science 2. Understand the Concept of Data Analysis 3. Explore the Mathematical and Statistical concepts needed for Data Science and Data Analyst 4. Design their own analytical tool for Data Science and Data Analyst 5. Make the students, industry ready Data Scientist and Data Analyst						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand Data Science					K2
2	Understand Data Analyst					K2
3	Understand the Mathematical foundation for Data Science & Data Analytics					K2
4	Apply Data Science & Data Analyst tools					K3
5	Design Data Science and Data Analyst Tools					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit : I						
Unit : I		Data Science	9 HOURS			
Data Science Introduction : Data, information, and knowledge - Data Science: the art of data exploration - What is not Data Science? - Data Science tasks - Data Science objectives - Applications of Data Science; Data sources, and generation : Introduction - Data attributes - Data-storage formats - Data sources - Data generation; Data preparation : Introduction - Data cleaning - Data reduction - Data transformation - Data normalization - Data integration						
Unit : II						
Unit : II		Data Analytics	9 HOURS			
Introduction to Data Analytics : Data Analytics Overview - Importance of Data Analytics - Roles and Responsibilities of a Data Analyst - Types of Data Analytics - Descriptive Analytics - Diagnostic Analytics - Predictive Analytics - Prescriptive Analytics - Benefits of Data Analytics; Introduction to Statistical Analysis : Counting, Probability, and Probability Distributions - Sampling Distributions - Estimation and Hypothesis Testing - Scatter Diagram - Anova and Chisquare - Imputation Techniques - Data Cleaning - Correlation and Regression; Data Visualization for Decision Making : Data Visualization Fundamentals of Data Visualization - Data Types, Measure Of central tendency, Measures of Dispersion - Graphical Techniques, Skewness & Kurtosis, Box Plot - Descriptive Stats - Sampling Funnel, Sampling Variation, Central Limit Theorem, Confidence interval						

Unit : III	Mathematical Foundation for Data Science and Data Analytics - I	9 HOURS
Probability : Sample Spaces - Conditional Probability and Independence - Density Functions - Expected Value - Variance - Joint, Marginal, and Conditional Distributions - Bayes' Rule - Model Given Data - Bayesian Inference; Convergence and Sampling : Sampling and Estimation - Probably Approximately Correct (PAC) - Concentration of Measure - Union Bound and Examples - Importance Sampling - Sampling Without Replacement with Priority Sampling; Linear Algebra : Vectors and Matrices - Addition and Multiplication - Norms - Linear Independence - Rank - Inverse – Orthogonality; Distances and Nearest Neighbors : Metrics - LP Distances and their Relatives - LP Distances - Mahalanobis Distance - COsine and Angular Distance - KL Divergence - Distances for Sets and Strings - Jaccard Distance - Edit Distance - Modeling Text with Distance : Modeling Text with Distances - Bag-of-Words Vectors - k-Grams - Similarities - Normed Similarities - Set Similarities - Locality Sensitive Hashing - Properties of Locality Sensitive Hashing - Prototypical Tasks for LSH - Banding to Amplify LSH - Properties of Locality Sensitive Hashing - Prototypical Tasks for LSH - Banding to Amplify LSH - LSH for Angular Distance - LSH for Euclidean Distance - Minhashing as LSH for Jaccard Distance		
Unit : IV	Mathematical Foundation for Data Science and Data Analytics - II	9 HOURS
Linear Regression : Simple Linear Regression - Linear Regression with Multiple Explanatory Variables - Polynomial Regression - Cross Validation - Regularized Regression - Tikhonov Regularization for Ridge Regression - Lasso - Dual Constrained Formulation - Orthogonal Matching Pursuit; Gradient Descent : Functions – Gradients - Gradient Descent - Learning Rate - Fitting a Model to Data - Least Mean Squares Updates for Regression - Decomposable Functions; Principal Component Analysis : Data Matrices - Projections - SSE Goal - Singular Value Decomposition - Best Rank-k Approximation - Eigenvalues and Eigenvectors - The Power Method - Principal Component Analysis -Multidimensional Scaling		
Unit : V	Clustering, Classification, and Graphs	9 HOURS
Clustering : Voronoi Diagrams - Delaunay Triangulation - Connection to Assignment-based - clustering - Gonzalez Algorithm for k-Center Clustering - Lloyd's Algorithm for k-Means Clustering - Lloyd's Algorithm - k-Means++ - k-Mediod Clustering - Soft Clustering - Mixture of Gaussians - Expectation-Maximization - Hierarchical Clustering - Soft Clustering - Mixture of Gaussians - Expectation-Maximization - Hierarchical Clustering - Mean Shift Clustering; Classification : Linear Classifiers - Loss Functions - Cross Validation and Regularization - Perceptron Algorithm - Kernels - The Dual: Mistake Counter - Feature Expansion - Support Vector Machines - KNN Classifiers - Neural Networks; Graphs : Markov Chains - Ergodic Markov Chains - Metropolis Algorithm - PageRank - Spectral Clustering on Graphs - Laplacians and their Eigen-Structure - Communities in Graphs - Preferential Attachment – Between– Modularity.		

UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Seminar, Assignment, and Case Studies		
	TOTAL LECTURE HOURS	47 HOURS
Text Book(s)		
1	Jugal K. Kalita, Dhruba K. Bhattacharyya, Swarup Roy, Fundamentals of Data Science, Academic Press, 2023	
2	Jeff M. Phillips, Mathematical Foundations For Data Analysis, Jeff M. Phillips, 2018	
3	Joel Grus, Data Science from Scratch, O'Reilly, 2019	
Reference Books		
1	Peter Bruce, Andrew Bruce and Peter Gedeck, Practical Statistics for Data Science, O'Reilly, 2020	
2	Bharti Motwani, Data Analytics using Python, Wiley, 2020	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.w3schools.com › data science	
2	https://www.kaggle.com › learn	
3	https://developer.nvidia.com/embedded/learn/tutorials	
Course Designed By: Dr.T.Ramesh		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITXEM	FINANCIAL TECHNOLOGIES	L	T	P	C
Core/Elective/Supportive		Elective	2	1	-	3
Pre-requisite		Knowledge about E-Commerce	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are : CO1: To understand the evolution of financial technology CO2: To explain the impact of AI on financial services CO3: To understand the technology of modern financial technology						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Gain knowledge about the evolution of financial technology					K2
2	Understand the technology impact in financial services					K2
3	Apply modern financial technology concepts in financial services					K3
4	Create their own technology in financial services					K6
5	Get a job with their own skills.					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
UNIT:I						
Introduction to Financial Technology			9 HOURS			
Evolution of FinTech - FinTech Evolution 1.0: Infrastructure - FinTech Evolution 2.0: Banking industry - FinTech Evolution 3.0 & 3.5: Startups and Emerging Markets - Importance of FinTech - Global FinTech Investment, Main FinTech Hubs						
UNIT:II						
Financial Technology in Financial Services Industry - I			9 HOURS			
FinTech in Payment Industry - Multichannel digital wallets - applications supporting wallets - onboarding and KYC application - FinTech in Lending Industry : Formal lending - Informal lending - P2P lending - POS lending - Online lending - Payday lending - Microfinance - Crowdfunding						
UNIT:III						
Financial Technology in Financial Services Industry-II			9 HOURS			
FinTech in Wealth Management Industry : Financial Advice - Automated investing - Socially responsible investing - Fractional Investing - Social Investing. FinTech in Insurance Industry : P2P insurance - On-Demand Insurance - On-Demand Consultation -Customer engagement through Quote to sell - policy servicing - Claims Management - Investment linked health insurance.						
UNIT:IV						
Modern Technology and Financial Technology Innovations			9 HOURS			
4G and 5G networks - transforming customer experience using Mobile Applications and smart phones, embedded sensors and social media, Cloud computing, Web 2.0, Rapid Web Design, JavaScript Technologies, IoT, Big Data Analytics and AI						

UNIT:V	Digital Finance	9 HOURS
Payments, Digital Finance and Alternative Finance - RTGS Systems Crypto currencies and Blockchain Technology- Legal and Regulatory - Implications of Crypto currencies Advantages of New Payment Stacks - Digitization of Financial Services - FinTech& Funds		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars, Case studies		
	TOTAL LECTURE HOURS	47 HOURS
Text Book(s)		
1	Sanjay Phadke, Fintech Future : The Digital DNA of Finance, Sage Publications, 2020	
2	Pranay Gupta, T. Mandy Tham, Fintech: The New DNA of Financial Services, RBI(2017). Report of working group on FinTech and Digital Banking 2018	
3	Parag Y Arjunwadkar, FinTech: The Technology Driving Disruption in the Financial Service Industry CRC Press, 2018.	
Reference Books		
1	Susanne Chishti, Janos Barberis (2016). The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries, Wiley Publications	
2	Richard Hayen (2016). FinTech: The Impact and Influence of Financial Technology on Banking and the Finance Industry	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://onlinecourses.nptel.ac.in	
Course Designed By: Dr.T.Ramesh		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITXEO	BLOCKCHAIN TECHNOLOGY	L	T	P	C
Core/Elective/Supportive		Elective	2	1	-	3
Pre-requisite		UG level – Computer Science	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. To give students the understanding of emerging abstract models for Blockchain Technology and to familiarise them with the functional/operational aspects of cryptocurrency eco-system.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Describe the basic concepts and technology used for blockchain.					K1
2	Describe the primitives of distributed computing and cryptography related to blockchain.					K6
3	Illustrate the concepts of Bitcoin and their usage.					K3
4	Apply security features in blockchain technologies.					K4
5	Use smart contracts in real world applications.					K1
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
Digital Money and Cryptography			9 HOURS			
Digital Money: Interbank Payments - Same Bank - Different Banks - Correspondent Bank - Accounts - Central Bank Accounts - International Payments - E-Money Wallets. Cryptography: Cryptography - Encryption and Decryption – Hashes - Digital Signatures.						
UNIT:II						
Crypto currencies - Bitcoin			9 HOURS			
Bitcoin: - Bitcoin, Bitcoin Working Principles - Bitcoin’s ECOsystem - Bitcoin in Practice - Bitcoin’s Predecessors - Bitcoin’s Early History - Bitcoin’s Price - Storing Bitcoins - Software Wallets - Hardware Wallets - Buying and Selling Bitcoins – Exchanges - Over the Counter (OTC) Brokers – Localbitcoins .						
UNIT:III						
Crypto currencies - Ethereum, Forks			9 HOURS			
Ethereum: Ethereum - Smart Contracts - Ethereum’s History - Actors in the Ethereum ECOsystem - Ether Price. Forks: A Fork of a Codebase - A Fork of a Live Blockchain: Chainsplits - Result of a Deliberate, Deliberate Chainsplit Working principles - Media Descriptions - Hard Forks vs Soft Forks.						
UNIT:IV						
Blockchain Technology			9 HOURS			
Blockchain Technology: - Public Blockchains – Speculation - Darknet Markets - Cross Border Payments - Initial Coin Offerings (ICOs) – Other - Private Blockchains - Notable Private Blockchains - Blockchain Experiments.						

UNIT:V	Initial Coin Offerings and Investing	9 HOURS
Initial Coin Offerings: -ICO –ICO working principles- Whitepapers - The Token Sale - ICO Funding Stages – Whitelisting - Funding Caps – Treasury - Exchange Listing – Token a Security Investing: Pricing - Controls the Price of Utility Tokens - Risks and Mitigations - Market Risk - Liquidity Risk - Exchange Risks - Wallet Risks - Regulatory Risks – Scams.		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars		
	TOTAL LECTURE HOURS	47 HOURS
Text Book(s)		
1	Antony Lewis, “The Basics of Bitcoins and Blockchains”, 2018, Mango Publishing Group.	
Reference Books		
1	Narayanan, Bonneau, Felten, Miller and Goldfeder, “Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction”, Princeton University Press.	
2	Josh Thompson, ‘Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming’, Create Space Independent Publishing Platform, 2017.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Blockchain By Dr.Mayank Aggarwal, GurukulKangriVishwavidyalaya, Haridwar	
Course Designed By: Dr.W.ROSE VARUNA		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITXEQ	EDGE COMPUTING	L	T	P	C
Core/Elective/Supportive		Elective	2	1	-	3
Pre-requisite		Fundamentals of Cloud Computing	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. Students will gain knowledge on Edge computing fundamentals and Architecture by learning Edge computing toolkits						
2. Edge computing paradigm covers a range of distributed computing, hosting and access solutions, including service-based computing						
3. The objective of the course is to provide comprehensive and in-depth knowledge of Edge Computing concepts, technologies, architecture and researching state-of-the-art in Edge Computing fundamental issues, technologies, applications and implementations.						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Understand Cloud computing limitations					K2
2	Understand Edge computing need and concepts					K2
3	Explore the different devices on edge computing					K3
4	Explore the software and protocols on edge computing					K4
5	Able to get the job on edge computing domain					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit : I	Introduction To Edge Computing				12 HOURS	
Introduction – Limitations of Cloud - From Cloud to Edge computing - Edge Computing Scenarios and Use cases – Need - Edge computing use cases, Edge platforms - Computing, Communication Models - Edge, Fog, and M2M.						
Unit : II	Edge Computing Applications and Devices				9 HOURS	
User Applications on edge computing (5G-Slicing, self-driving cars, and more) - Distributed systems in edge computing: time ordering - clock synchronization - distributed snapshot, etc. Hardware architecture : Different classes of Edge hardware - connected through embedded systems - Communication hardware – SCADA - Networking topologies - Personal area networks – LANs - Wide area networks						
Unit : III	Edge Computing Software and Framework				9 HOURS	
Software and System Frameworks : Edge functions and services - Security and hardening - Remote management and monitoring - Interconnectivity and networking - Software provisioning and upgradability - Reliability and robustness Operating system : Software architecture – Frameworks – Edge X Foundry - Microsoft Azure IoT Edge - Digital twins - The fog and the mist - System architecture - Introduction to Edge Data Center, Lightweight Edge Clouds, and their services provided by different service providers. - Introduction to Docker container and Kubernetes in edge computing. Design of edge storage systems like key-value stores						

Unit : IV	Edge Computing Networks and Protocols	9 HOURS
Connecting Things - Networking and Communications : Edge Communication systems - Radio spectrum - Near-range communication (PAN) – Bluetooth - NFC and RFID - Meshes (Zigbee PAN) - Near-range communication use cases - Long-range communication - 5G and cellular – LoRaWAN - Satellite communication Edge Protocols : Language of Edge Machines - Network layering and the basics of the OSI model - Diving deep into TCP/IP networking - Industrial IoT communications - language of factory machines - Message-oriented, stream-oriented, and RESTful protocols - prevalent Edge communication standard –Introduction to MQTT and Kafka for end-to-end edge pipeline. Edge analytics topologies for M2M and WSN network - MQTT Alternative protocols – CoAP and AMQP - Protocol comparison		
UNIT : V	Edge Computing Security and Application	9 HOURS
Security : Types and vulnerabilities - pervasive internet hack – Mirai - Grand theft auto -Credit card fraud – using the HVAC supplier - Security architecture - Hardware security - Software security - Communications and network security - Physical security - Final thoughts on security Use cases of machine learning for edge sensor data in predictive maintenance, image classifier and self-driving cars. Deep Learning On-Device inference at the edge to support latency-based applications		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars Latest developments/topics in Cloud Computing		
TOTAL LECTURE HOURS		47 HOURS
Text Book(s)		
1	Perry Lea, Edge Computing Simplified, Packt Publishing, 2024	
2	D. Dharani, G. Sudha Sadasivam, K. Anitha Kumari, M. Niranjanamurthy, Edge Computing: Fundamentals, Advances and Applications (Advances in Industry 4.0 and Machine Learning), Taylor & Francis Ltd, 2021	
3	William Smith, Edge Computing: From Basics to Expert Proficiency, HiTeX Press; 2024	
4	Rajkumar Buyya, Satish Narayana Srirama Fog and Edge Computing: Principles and Paradigms, , Wiley, 2019	
Reference Book(s)		
1	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011	
2	Rajiv Misra, Yashwant Patel, Cloud and Distributed Computing: Algorithms and Systems, Wiley 2020.	
3.	Ajit Sing, Edge Computing: Simply In Depth Independently Published, 2019	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.ibm.com › think › topics › edge-computing
2	https://www.accenture.com › in-en › insights › cloud › edge
Course Designed By: Dr.T.Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M
*S-Strong; M-Medium; L-Low										

Course code	25ITXES	DIGITAL MARKETING	L	T	P	C
Core/Elective/Supportive		Elective	2	1	-	3
Pre-requisite		Exposure to Marketing and Advertising	Syllabus Version		2025-26	
Course Objectives:						
After completion of the course, the students will be able to						
1. Understand the influences of digital in marketing						
2. Under the marketing skills and current trends						
3. Design and develop their digital marketing content						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Understand marketing skills				K2	
2	Understand Advertising Skills				K2	
3	Understand the current trends in digital marketing				K2	
4	Design and develop digital marketing content				K3	
5	Get a job/ freelancer in the Digital Marketing domain.				K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
Unit : I		Introduction to Digital Marketing			9 HOURS	
Digital Marketing : Fundamentals – Importance - Traditional marketing Vs Digital Marketing - Evolution of Digital Marketing - Key Drivers - Digital Consumer & Communities, Gen Y & Netizen’s expectation & influence						
The Digital users in India - Digital marketing Strategy- Consumer Decision journey - POEM Framework - Segmenting & Customizing messages - Digital advertising Market in India - Skills in Digital Marketing - Digital marketing Plan.						
Unit : II		Terminology used in Digital Marketing			9 HOURS	
PPC and online marketing through social media Social Media Marketing - SEO techniques - Keyword advertising - Google web-master and analytics overview - Affiliate Marketing - Email Marketing - Mobile Marketing - Display advertng - Buying Models - different type of ad tools - Display advertising terminology - types of display ads - different ad formats - Ad placement techniques - Important ad terminology - Programmatic Digital Advertising.						
Unit : III		Social Media Marketing I			9 HOURS	
Fundamentals of Social Media Marketing – Importance - Necessity of Social media Marketing - Goal Setting - Implementation.						
Facebook Marketing: Facebook for Business - Facebook Insight - formats - Setting up Facebook Advertising Account - Facebook audience & types - Designing Facebook Advertising campaigns - Facebook Avatar – Apps – Live – Hashtags						

Unit : IV	Social Media Marketing II	9 HOURS
LinkedIn: Importance – Strategy - Content - LinkedIn analysis – Targeting - Ad Campaign		
Twitter : Basics - Building a content strategy - Twitter usage - Twitter Ads - Twitter ad campaigns- Twitter Analytic -Twitter Tools and tips for mangers -		
Unit : V	Social Media Marketing III	9 HOURS
Instagram : Content Creation – Visual Identity – Audio & Video editing – Instagram Analysis		
You Tube : Content engine – setting up channel – video editing – audio editing – graphic design – video performance – YouTube Analysis		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
TOTAL LECTURE HOURS		47 HOURS
Text Book(s)		
1	Vandana Ahuja, Digital Marketing, OXFORD UNIVERSITY PRESS, INDIA, 201	
2	Damian Ryan (Author), Calvin Jones. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan, 2008	
3	Mr. Prakash B. Narke Prof. Nitin Ka, mat , Dr. Manik S. Kadam , Dr. Abhay S. Kinikar , Mr. Pramod Jejurikar, Digital Marketing, Nirali Prakashan, 2021	
Reference Books		
1	Annmarie Hanlon (Author), Joanna Akins, Quick Win Digital Marketing, Oak Tree Press, 2009	
2	Seema Gupta, Digital Marketing, 2022	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1. https://www.oracle.com › ... › Marketing		
2. https://www.investopedia.com/terms/d/digital-marketing		
Course Designed By: Dr.T.Ramesh		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong;

M-Medium;

L-Low

Course code	25ITXEB	ADVANCED DATABASE MANAGEMENT SYSTEMS -LAB	L	T	P	C
Core/Elective/Supportive	Elective		-	-	2	2
Pre-requisite	UG level – Database management system		Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. This course aims at facilitating the student to understand the various functionalities of DBMS software.						
2. It helps to perform many operations related to creating, manipulating and maintaining databases for Real-world applications						
3. It helps the students to understand the various designing concepts, storage methods, querying and managing databases.						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Explain the structure and model of the relational database system					K2
2	Design multiple tables, and using group functions, sub queries					K3
3	Design a database based on a data model considering the normalization to a specified level					K4
4	Estimate the storage size of the database and design appropriate storage techniques					K3
5	Analyze the requirements of transaction processing, concurrency control					K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
Introduction			6 HOURS			
Database Design and the E-R Model: The Entity-Relationship Model, Entity-Relationship Diagrams, Normalization: Introduction, Nonloss Decomposition and Functional Dependencies, 1NF, 2NF and 3NF, Boyce/ Codd Normal Form. Parallel Databases: I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism.						
UNIT:II						
Object-Based Distributed and Databases			6 HOURS			
Distributed Databases: Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing. Object-Based Databases: Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multiset, Object Identity and Reference Types, Object Oriented versus Object Relational.						
UNIT:III						
XML			6 HOURS			
XML: Structure of XML Data, XML Document Schema - Document Type Definition (DTD) - XML Schema, XML Querying and Transformation - Tree Model of XML – Xpath – Xquery, Application Program Interfaces to XML, Storage of XML Data - Nonrelational Data Stores - Relational Databases - SQL/XML, XML Applications - Storing Data with Complex Structure - Standardized Data Exchange Formats - Web Services - Data Mediation.						

UNIT:IV	Spatial and Temporal Data and Mobility	6 HOURS
Time in Databases - Time Specification in SQL - Temporal Query Languages, Spatial and Geographic Data - Representation of Geometric Information - Design Databases - Geographic Data - Spatial Queries - Indexing of Spatial Data, Multimedia Databases - Multimedia Data Formats - Continuous-Media Data - Similarity-Based Retrieval, Mobility and Personal Databases - A Model of Mobile Computing - Routing and Query Processing - Broadcast Data - Disconnectivity and Consistency.		
UNIT:V	NoSQL	6 HOURS
NoSQL Basics - Definition and Introduction - Sorted Ordered Column-Oriented Stores - Key/Value Stores - Document Databases - Graph Databases - Interfacing and Interacting with NoSQL - Language Bindings for NoSQL Data Stores – Storage Architecture- HBase Distributed Storage Architecture - NoSQL in Cloud - Google App Engine Data Store- Amazon SimpleDB – Case Study in MongoDB.		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars– webinars, Latest developments/topics in Advanced DBMS		
	TOTAL LECTURE HOURS	32 HOURS
Text Book(s)		
1	Silberschatz, Korth, Sudarshan, “Database system concepts”, 6th Edition, Tata McGraw Hill (For UNITS I, IV), 2011.	
2	C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, 8th Edition, Pearson Education Reprint 2016.	
3	Shashank Tiwari, “Professional NoSQL” (For UNIT V), 2011.	
Reference Books		
1	RamezElmasri, Shamkant B. Navathe,“Fundamentals ofDatabaseSystems”, 6th Edition, Addison-Wesley.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Database Management SystemBy Dr. B. Lavanya, Associate Professor, University of Madras, Chennai, Tamil Nadu, Duration : 12 weeks	
Course Designed By:Dr.W.ROSEVARUNA		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	L	M	S	S
CO3	S	S	S	S	S	S	L	M	M	S
CO3	M	M	M	S	S	L	L	L	M	M
CO4	L	L	S	S	S	L	L	M	S	M
CO5	M	M	S	S	S	M	L	L	S	S

*S-Strong;

M-Medium;

L-Low

Course Code	25ITXED	GRAPHICS AND MULTIMEDIA SYSTEMS - LAB	L	T	P	C
Core/ Elective/ Supportive		Elective	-	-	2	2
Pre-requisite		UG Degree level: Graphics and Multimedia	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to: 1. To give a brief understanding of computer graphics. 2. To enable students to know the writing program for DDA, Brenham’s, Midpoint Circle Generation, and Ellipse Generation Algorithms. 3. To describe the ways to create various types of texts and fonts. 4. To introduce programming knowledge in 2-D and 3-D transformation. 5. To learn the step-by-step process of how to develop a program for Curve Generation and animations.						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Describe technical characteristics and performance of multimedia systems and terminals.					K2
2	Design creative approach in the application of multimedia devices, equipment, and systems					K6
3	Carry out experiments and measurements on the multimedia systems in laboratory conditions on real components and equipment.					K3
4	Interpret and analyze measurement results obtained on the multimedia system and components.					K4
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6– Create						
UNIT:I	INTRODUCTION TO COMPUTER GRAPHICS			6 HOURS		
Introduction to Computer Graphics: Applications of Computer Graphics, Operations of Computer Graphics, Graphics Software Packages, Requirements, Scan Conversion: Methods, Polynomial Method, DDA Algorithms, Bresenham’s Algorithms.						
UNIT:II	TRANSFORMATIONS			6 HOURS		
2-DGeometrical Transformations: Basic Transformations, Homogeneous Coordinate Systems, Creating two-dimensional objects, Two Dimensional Transformations, 3-D Geometrical Transformations: Basic 3-D Transformations, 3-D Translation. Scaling, Rotation, Three Dimensional Transformations.						
UNIT:III	INTRODUCTION TO MULTIMEDIA			6 HOURS		
Introduction to Multimedia: Concepts of Multimedia, Types, Multimedia data Streams, hardware/Software Requirements, Applications, MIDI, Image Compression Standards, Video, Hypertext and Hypermedia,Coloring the Pictures, Curve Generation						
UNIT:IV	FILE FORMATS			6 HOURS		
Graphics Image File Formats: Image File Formats, Joint Photographic Experts Group, Tagged Image File Format, JPEG and JFIF, JFIF Format, GIF Format, TIFF File Formats. Creating various types of texts and fonts, Creating various types of images.						

UNIT:V	TOOLS FOR THE WORLD WIDE WEB	6 HOURS
Multimedia Tools in the Information Commons, Audio, Video, Photo, Text Scanning, and OCR, Font Editing and Design Tools, Text Editing and Word Processing Tool, Image Editing Tool, Painting and Drawing Tools, Sound Editing Tool, Animation, Video, Simple Animations using transformations, Key Frame Animation		
UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars		
	TOTAL LECTURE HOURS	32 HOURS
Text Book(s)		
1	Fundamentals of Computer Graphics, International Student Edition By Steve (Cornell University Marschner, Ithaca New York USA), Peter Shirley · 2022, Taylor and Francis Limited Publication	
2	Computer Graphics And Multimedia (Hb 2022) by Moody L, Kaufman Press	
Reference Book(s)		
1	Computer Graphics: Theory and Practical by Dr.PulasthiGunawardhana · 2020, Scientific Research Publishing, Inc. USA.	
2	Introduction to Computer Graphics, A Practical Learning Approach by Fabio Ganovelli, Massimiliano Corsini, SumantaPattanaik, Marco Di Benedetto · 2014, CRC Press	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Introduction to Computer Graphics, Dr.Prem Kalra, Dept of CSE, IIT.	
Course Designed By: Dr.R.VADIVEL		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	L
CO3	S	S	M	S	S	S	S	S	S	S
CO4	L	M	L	L	S	M	S	S	S	S
CO5	M	L	M	S	L	S	S	S	L	M

*S-Strong; M-Medium; L-Low

Course Code	25ITXEF	ADVANCED JAVA PROGRAMMING - LAB	L	T	P	C
Core/ Elective/ Supportive		Elective	-		2	2
Pre-requisite		UG-Degree Level: Basic JAVA, OOPS concepts, JDBC/ODBC connection.	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to: 1. Objective of this course to provide the ability to design console based applications, GUI based and web based applications. 2. Students will also be able to understand integrated development environment to create, debug and run. 3. Multi-tier and enterprise-level applications. Design and analyse programs using remote method invocations (RMI).						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Implement the basic object-oriented programming concepts like encapsulation, polymorphism, and various AWT concepts, overriding and overloading methods.				K3	
2	Using advanced java concepts to develop Client/Server communication and Remote Method Invocation (RMI), URL connection establish.				K3	
3	Initialize the Applet Program and Develop the delegation event model, Mouse event Handling.				K3	
4	Connections establish between JDBC vs ODBC, and also write the simple servlet program.				K3	
5	Create the EJB, Message Driven Beans.				K3	
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6– Create						
UNIT: I		Basic Concepts			6 HOURS	
Experiments on Inheritance, Method Overriding, Method Overloading, Swing and AWTComponents-java.sql packages.						
UNIT: II		Distributed AppApplications and Networking			6 HOURS	
Experiments on RMI and networking						
UNIT: III		Applets and Events			6 HOURS	
Experiments on Applets, HTML, and Event Handling						
UNIT: IV		JDBC and Servlets			6 HOURS	
Applications on Servlet, and JDBC						
UNIT: V		JSP and EJP			6 HOURS	
Experiments on JSP and EJP						

UNIT: VI		CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars – webinars Applications in Advanced Java Programming			
		TOTAL LECTURE HOURS	32 HOURS
Text Book(s)			
1	Java: The Complete Reference, Twelfth Edition, Herbert Schildt · 2021 McGraw-Hill Education		
2	Programming with Java, E Balagurusamy · 2019, McGraw-Hill Education		
3	Java – The Complete Reference, Herbert Schildt, Tata McGraw –Hill, ninth edition, 2018.		
Reference Book(s)			
1	Java How To Program, Paul Deitel, Harvey Deitel · 2019, Pearson Education		
2	Java Projects Learn the Fundamentals of Java 11 Programming by Building Industry Grade Practical Projects, 2nd Edition, Peter Verhas · 2018		
Related Online Contents [MOOK, SWAYAM, NPTEL, Websites etc.]			
1	https://nptel.ac.in/courses/106.105.106105191/ ,		
2	https://www.digimat.in/nptel/courses/video/106105191/L01.html ,		
3	https://nptel.ac.in/noc/courses/noc20SEMI/noc20-cs08/ ,		
4	https://www.youtube.com/watch?v=VksxhzfD8kQ		
5	https://swayam.gov.in/nd1_noc19_cs84/preview		
6	https://www.goeduhub.com/free-solution-for-different-universities-java-lab-experiments		
Course Designed By:Dr.R.VADIVEL			

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	L
CO3	S	S	M	S	S	S	S	S	S	S
CO4	L	M	L	L	S	M	S	S	S	S
CO5	M	L	M	S	L	S	S	S	L	M

*S-Strong; M-Medium; L-Low

Course Code	25ITXEH	EXTENDED REALITY- LAB	L	T	P	C
Core/Elective/Supportive		Elective	-	-	2	2
Pre-requisite		Introduction to Computer Graphics and Image Processing	Syllabus version		2025-26	
Course objectives						
1. To design and develop AR and VR 2. To make the students aware of the various AR, and VR devices. 3. To get exposure to AR and VR						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Explore the different software on AR and VR				K1	
2	Explore the different hardware on AR and VR				K2	
3	Use computer vision concepts for AR and VR design				K3	
4	Design and develop their own AR and VR				K4	
5	To get the jobs on AR and VR domain				K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT: I		Geometric Modelling			6 HOURS	
Design and develop 2D and 3D Modelling						
UNIT:II		Virtual Reality(VR) Development Tools			6 HOURS	
Explore different Input Devices, Output devices and software for VR						
UNIT:III		Simulation on VR			6 HOURS	
Simulation on AR						
UNIT:IV		Augmented Reality (AR):			6 HOURS	
Explore AR devices						
UNIT:V		Augmented Reality Software			6 HOURS	
Explore AR software Design and develop their own software						
UNIT : VI		CONTEMPORARY ISSUES			2 HOURS	
Assignment/Seminar on Modern AR and VR tools on the Market						
TOTAL LECTURER HOURS					32 HOURS	

Text Books :	
1	Rajesh K. Maurya, Computer Graphics with Virtual Reality System, 3rd Edition, Wiley Publication, 2018.
2	Schmalstieg, D., Höllerer, T., “Augmented Reality: Principles & Practice,” Pearson, 2016
3	Norman, K., Kirakowski, J., “Wiley Handbook of Human Computer Interaction,” Wiley-Blackwell, 2018
4	LaViola Jr., J. J., Kruijff, E., McMahan, R. P., Bowman, D. A., Poupyrev, I., “3D User Interfaces: Theory and Practice,” Pearson, 2017
5	Fowler, A., “Beginning iOS AR Game Development: Developing Augmented Reality Apps with Unity and C#,” Apress, 2019
6	Hassanien, A. E., Gupta, D., Khanna, A., Slowik, A., “Virtual and Augmented Reality for Automobile Industry: Innovation Vision and Applications,” Springer, 2019
Reference Books :	
1	William R. Sherman and Alan B. Craig, Understanding Virtual Reality Interface, Application, and Design, 2nd Edition, Morgan Kaufmann Publishers, Elsevier, 2019.3
2	Grigore C. Burdea, Philippe Coiffet, Virtual Reality Technology, 2nd Edition, Wiley, 2017.
3	K.S. Hale and K. M. Stanney, Handbook on Virtual Environments, 2nd Edition, CRC Press, 2014
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1. http://vr.cs.uiuc.edu/vrbook.pdf	
2. https://nptel.ac.in/courses/106/106/106106138/	
Course Designed by : Dr.T. Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	S	M	S	M
CO2	S	S	S	S	M	S	M	L	S	L
CO3	M	M	L	L	L	M	L	M	M	M
CO4	M	S	M	L	S	S	M	L	L	S
CO5	M	S	S	M	M	L	S	M	M	L

*S-Strong; M-Medium; L-Low

Course code	25ITXEJ	INDUSTRIAL AUTOMATION AND ROBOTICS - LAB	L	T	P	C
Core/Elective/Supportive		Elective	-	-	2	2
Pre-requisite		Basics about the Automation	Syllabus Version		2025-26	
Course Objectives :						
The main objectives of this course are to: 1. Explore the basic components of Robotics 2. Explore the different industrial automation techniques 3. Apply AI on robotics and Industrial applications						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Explore the Basics of Robotics					K2
2	Explore the components of Robotics					K3
3	Apply different operations to Robotics					K4
4	Apply AI operations on					K5
5	Design their own automation techniques					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I	Introduction to Robotics and Industrial Robotics				6 HOURS	
Explore the different operation on robotics						
UNIT:II	Direct and Inverse Kinematics				6 HOURS	
Apply AI on Robotics operations						
UNIT:III	Robot Actuators, Feed Back Components, and Manipulator Differential Motion				6 HOURS	
Apply different sensor on robotics						
UNIT:IV	Path Planning, Dynamics and Control				6 HOURS	
Design own robotics						
UNIT:V	Applications of Robots in Manufacturing				6 HOURS	
Innovative design on robotics						

UNIT : VI		CONTEMPORARY ISSUES	2 HOURS
		TOTAL LECTURE HOURS	32 HOURS
Text Book(s)			
1	Mikell P. Groover, Automation, Production Systems and CIM, Prentice-Hall of India Pvt. Ltd, 2016.		
2	Nicholas Odrey, Mitchell Weiss, Mikell Groover, Roger Nagel, Ashish Dutta, Industrial Robotics - Technology, Programming and Applications (SIE), , McGraw-Hill 2nd Edition, 2017.		
3.	Niku, S. B, John, Introduction to Robotics: Analysis, Control and Applications. Wiley & Sons, 2020.		
4.	R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2017		
Reference Books			
1	K.S.Fu., R.C.Gonzalez, C.S.G. Lee, Robotics: Control Sensing, Vision and Intelligence Indian Edition, McGraw Hill Book Co., 2008.		
2	Coiffet, P., & Chirouze, M, An introduction to robot technology, Springer Science & Business Media, 2012.		
3.	Mittal R.K & Nagrath IJ, Robotics and Control, , McGraw-Hill, 2017.		
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]			
1. https://www.automationanywhere.com › rpa › robotic-pr...			
2. http://www.https://ifr.org/			
Course Designed by : Dr.T.Ramesh			

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITXEL	DATA SCIENCE AND DATA ANALYTICS – LAB	L	T	P	C
Core/Elective/Supportive		ELECTIVE	-	-	2	2
Pre-requisite		UG LEVEL – DATA MINING, DATA STRUCTURE, AND STATISTICS, PYTHON PROGRAMMING	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to: 1. Understand the Concept Data Science 2. Understand the Concept of Data Analysis 3. Explore the Mathematical and Statistical concepts needed for Data Science and Data Analytics 4. Design their own analytical tool for Data Science and Data Analytics 5. Make the students, industry ready Data Scientist and Data Analytics						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand Data Science				K2	
2	Understand Data Analyst				K2	
3	Understand the Mathematical foundation for Data Science & Data Analytics				K2	
4	Apply Data Science & Data Analyst tools				K3	
5	Design Data Science and Data Analyst Tools				K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit : I						
Unit : I		Python Library tools for Data Science			6 HOURS	
Explore the Data Science tools						
Unit : II						
Unit : II		Python Library tools for Data Analytics			6 HOURS	
Explore the Data Analytics tools						
Unit : III						
Unit : III		Mathematical Foundation for Data Science and Data Analytics - I			6 HOURS	
Probability : Convergence and Sampling : Linear Algebra ; Distances and Nearest Neighbors						
Unit : IV		Mathematical Foundation for Data Science and Data Analytics - II			6 HOURS	
Experiments on Linear Regression ; Gradient Descent ; Principal Component Analysis						

Unit : V	Clustering, Classification, and Graphs	6 HOURS
Experiments on Clustering, Classification and Graphs		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Case studies		
	TOTAL LECTURE HOURS	32 HOURS
Text Book(s)		
1	Bharti Motwani, Data Analytics using Python, Wiley, 2020	
2	Peter Bruce, Andrew Bruce, and Peter Gedeck, Practical Statistics for Data Science, O'Reilly, 2020	
3	Joel Grus, Data Science from Scratch, O'Reilly, 2019	
Reference Books		
1	Jeff M. Phillips, Mathematical Foundations for Data Analysis, Jeff M. Phillips, 2018	
2	Jugal K. Kalita, Dhruba K. Bhattacharyya, Swarup Roy, Fundamentals of Data Science, Academic Press, 2023	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.w3schools.com › datascience	
2	https://www.kaggle.com › learn	
3	https://developer.nvidia.com/embedded/learn/tutorials	
Course Designed By: Dr.T.Ramesh		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITXEN	FINANCIAL TECHNOLOGIES LAB	L	T	P	C
Core/Elective/Supportive		Elective	2	-	-	2
Pre-requisite		Knowledge about E-Commerce	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are : CO1: To understand the evolution of financial technology CO2: To explain the impact of AI on financial services CO3: To understand the technology of modern financial technology						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Gain knowledge about the evolution of financial technology					K2
2	Understand the technology impact in financial services					K2
3	Apply modern financial technology concepts in financial services					K3
4	Create their own technology in financial services					K6
5	Get a job with their own skills.					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
UNIT:I						
Financial Applications			6 HOURS			
Financial Applications with AI						
UNIT:II						
Financial Technology in Financial Services Industry - I			6 HOURS			
Programming in Payment Industry						
UNIT:III						
Financial Technology in Financial Services Industry-II			6 HOURS			
Programming P2P applications – financial services						
UNIT:IV						
Modern Technology and Financial Technology Innovations			6 HOURS			
Explore Web 2.0						
UNIT:V						
Digital Finance			6 HOURS			
Explore Block chain technologies - Explore RTGS						
UNIT:VI						
CONTEMPORARY ISSUES			2 HOURS			
Case studies - Modern tools						
TOTAL LECTURE HOURS			32 HOURS			

Text Book(s)	
1	Sanjay Phadke, Fintech Future: The Digital DNA of Finance, Sage Publications, 2020
2	Pranay Gupta, T. Mandy Tham, Fintech: The New DNA of Financial Services, RBI(2017). Report of Working Group on FinTech and Digital Banking 2018
3	Parag Y Arjunwadkar, FinTech: The Technology Driving Disruption in the Financial Service Industry CRC Press, 2018.
Reference Books	
1	Susanne Chishti, Janos Barberis (2016). The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries, Wiley Publications
2	Richard Hayen (2016). FinTech: The Impact and Influence of Financial Technology on Banking and the Finance Industry
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://onlinecourses.nptel.ac.in
Course Designed By: Dr.T.Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITXEP	BLOCKCHAIN TECHNOLOGY - LAB	L	T	P	C
Core/Elective/Supportive		Elective	-	-	2	2
Pre-requisite		UG level – Computer Science	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
2. To give students the understanding of emerging abstract models for Blockchain Technology and to familiarise them with the functional/operational aspects of cryptocurrency eco-system.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Describe the basic concepts and technology used for blockchain.					K1
2	Describe the primitives of distributed computing and cryptography related to blockchain.					K6
3	Illustrate the concepts of Bitcoin and their usage.					K3
4	Apply security features in blockchain technologies.					K4
5	Use smart contracts in real world applications.					K1
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
Digital Money and Cryptography			6 HOURS			
Digital Money: Interbank Payments - Same Bank - Different Banks - Correspondent Bank - Accounts - Central Bank Accounts - International Payments - E-Money Wallets. Cryptography: Cryptography - Encryption and Decryption – Hashes - Digital Signatures.						
UNIT:II						
Crypto currencies - Bitcoin			6 HOURS			
Bitcoin: - Bitcoin, Bitcoin Working Principles - Bitcoin’s ECOsystem - Bitcoin in Practice - Bitcoin’s Predecessors - Bitcoin’s Early History - Bitcoin’s Price - Storing Bitcoins - Software Wallets - Hardware Wallets - Buying and Selling Bitcoins – Exchanges - Over the Counter (OTC) Brokers – Localbitcoins .						
UNIT:III						
Crypto currencies - Ethereum, Forks			6 HOURS			
Ethereum: Ethereum - Smart Contracts - Ethereum’s History - Actors in the Ethereum ECOsystem - Ether Price. Forks: A Fork of a Codebase - A Fork of a Live Blockchain: Chainsplits - Result of a Deliberate, Deliberate Chainsplit Working principles - Media Descriptions - Hard Forks vs Soft Forks.						
UNIT:IV						
Blockchain Technology			6 HOURS			
Blockchain Technology: - Public Blockchains – Speculation - Darknet Markets - Cross Border Payments - Initial Coin Offerings (ICOs) – Other - Private Blockchains - Notable Private Blockchains - Blockchain Experiments.						

UNIT:V	Initial Coin Offerings and Investing	6 HOURS
Initial Coin Offerings: -ICO –ICO working principles- Whitepapers - The Token Sale - ICO Funding Stages – Whitelisting - Funding Caps – Treasury - Exchange Listing – Token a Security Investing: Pricing - Controls the Price of Utility Tokens - Risks and Mitigations - Market Risk - Liquidity Risk - Exchange Risks - Wallet Risks - Regulatory Risks – Scams.		
UNIT:VI	Contemporary Issues	2 HOURS
Expert lectures, online seminars – webinars		
	Total Lecture hours	32 HOURS
Text Book(s)		
1	Antony Lewis, “The Basics of Bitcoins and Blockchains”, 2018, Mango Publishing Group.	
Reference Books		
1	Narayanan, Bonneau, Felten, Miller and Goldfeder, “Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction”, Princeton University Press.	
2	Josh Thompson, ‘Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming’, Create Space Independent Publishing Platform, 2017.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	Blockchain By Dr.Mayank Aggarwal, GurukulKangriVishwavidyalaya, Haridwar	
Course Designed By: Dr.W.ROSE VARUNA		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITXER	EDGE COMPUTING -LAB	L	T	P	C
Core/Elective/Supportive		Elective	-	-	2	2
Pre-requisite		Programming Python – Knowledge in Network Programming	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to: 1. Students will gain knowledge on Edge computing fundamentals and Architecture by learning Edge computing toolkits 2. Edge computing paradigm covers a range of distributed computing, hosting and access solutions, including service-based computing 3. The objective of the course is to provide comprehensive and in-depth knowledge of Edge Computing concepts, technologies, architecture and researching state-of-the-art in Edge Computing fundamental issues, technologies, applications and implementations.						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Understand Cloud computing limitations					K2
2	Understand Edge computing need and concepts					K2
3	Explore the different devices on edge computing					K3
4	Explore the software and protocols on edge computing					K4
5	Able to get the job on edge computing domain					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
Unit : I						
Edge Computing Application					6 HOURS	
Explore the Edge Computing Applications						
Unit : II						
Edge Computing Devices					6 HOURS	
Explore the edge computing devices						
Unit : III						
Edge Computing – Service provider’s software					6 HOURS	
Explore : Edge X Foundry - Microsoft Azure IoT Edge - Digital twins						
Unit : IV						
Edge Computing Networks and Protocols					6 HOURS	
Explore Edge Communication systems - Radio spectrum - Near-range communication (PAN) – Bluetooth - NFC and RFID - Meshes (Zigbee PAN) - Near-range communication use cases - Long-range communication - 5G and cellular – LoRaWAN - Satellite communication Edge Protocols : MQTT, Kafka, CoAP and AMQP						

UNIT : V	Edge Computing Security and Application	6 HOURS
Explore Security applications and their types.		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Expert lectures, online seminars, webinars, and experiments on Lab Latest developments/topics in Cloud Computing		
TOTAL LECTURE HOURS		32 HOURS
Text Book(s)		
1	Perry Lea, Edge Computing Simplified, Packt Publishing, 2024	
2	D. Dharani, G. Sudha Sadasivam, K. Anitha Kumari, M. Niranjanamurthy, Edge Computing: Fundamentals, Advances and Applications (Advances in Industry 4.0 and Machine Learning), Taylor & Francis Ltd, 2021	
3	William Smith, Edge Computing: From Basics to Expert Proficiency, HiTeX Press; 2024	
4	Rajkumar Buyya, Satish Narayana Srirama Fog and Edge Computing: Principles and Paradigms, , Wiley, 2019	
Reference Book(s)		
1	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011	
2	Rajiv Misra, Yashwant Patel, Cloud and Distributed Computing: Algorithms and Systems, Wiley 2020.	
3.	Ajit Sing, Edge Computing: Simply In Depth Independently Published, 2019	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.ibm.com › think › topics › edge-computing	
2	https://www.accenture.com › in-en › insights › cloud › edge	
Course Designed By: Dr.T.Ramesh		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITXET	Digital Marketing - Lab	L	T	P	C
Core/Elective/Supportive		Elective	-	-	2	2
Pre-requisite		Exposure to Marketing, Advertising and Social Networks	Syllabus Version		2025-26	
Course Objectives:						
After completion of the course, the students will be able to						
1. Understand the influences of digital in marketing						
2. Under the marketing skills and current trends						
3. Design and develop their digital marketing content						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Understand marketing and advertising skills				K2	
2	Understand the social media influences the people				K2	
3	Understand the current trends in digital marketing				K2	
4	Design and develop digital marketing content				K3	
5	Get a job/ freelancer in the Digital Marketing domain.				K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
Unit : I		Digital Marketing			6 HOURS	
Content creation for digital marketing						
Unit II :		Facebook Marketing			6 HOURS	
Design and Develop the content for Facebook						
Unit III :		LinkedIn and Twitter Marketing			6 HOURS	
Content creation for LinkedIn and Twitter Marketing						
Unit : IV		Instagram marketing			6 HOURS	
Content creation for Instagram						
Unit V :		YouTube marketing			6 HOURS	
Content creation for You Tube						
UNIT : VI		CONTEMPORARY ISSUES			2 HOURS	
Seminar and Case Studies						
	TOTAL LECTURE HOURS				32 HOURS	

Text Book(s)	
1	Vandana Ahuja, Digital Marketing, OXFORD UNIVERSITY PRESS, INDIA, 201
2	Damian Ryan (Author), Calvin Jones. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan, 2008
3	Mr. Prakash B. Narke Prof. Nitin Ka, mat , Dr. Manik S. Kadam , Dr. Abhay S. Kinikar , Mr. Pramod Jejurikar, Digital Marketing, Nirali Prakashan, 2021
Reference Books	
1	Annmarie Hanlon (Author), Joanna Akins, Quick Win Digital Marketing, Oak Tree Press, 2009
2	Seema Gupta, Digital Marketing, 2022
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1. https://www.oracle.com › ... › Marketing 2. https://www.investopedia.com/terms/d/digital-marketing	
Course Designed By: Dr.T.Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25IT1J1	ANIMATION TECHNIQUES	L	T	P	C
Course :		JOB-ORIENTED COURSE	2	-	-	-
Pre-requisite		COMPUTER GRAPHICS	Syllabus Version		2025-26	
Instructions : - The course can be conducted/taught by either a department faculty member or an Industrial person. - It is a Non-credit course - There are no internal marks and external marks. However, the examination will be conducted by the faculty member in charge of the course. - The examination will be conducted for a maximum 50 marks, and the marks should be submitted to the Controller of Examination. - Marks will not be reflected in the mark statement, since it is not calculated for the CGPA.						
Course Objectives:						
The Main Objectives of this Course are to: Students - To understand the basic concepts of Animation - Understand the need for the Animation Industry - Learn the advanced features in Animation						
Expected Outcomes						
On the successful completion of the course, the student will be able to:						
1	Under the Basics of Animation techniques					K2
2	Understand the 3D Animation techniques					K2
3	Explore the storytelling concept					K3
4	Design their own ideas to create an Animation					K3
5	Design their own story using storytelling					K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I		Animation Basics			6 HOURS	
Introduction to Animation – need for Animation – History of Animation– Uses of Animation – Principles of Animation – Human perception – Color Wheel						
UNIT:II		2D Animation			6 HOURS	
Types of Animation – Terms on Animation - Techniques of Animation – Animation on the WEB – 2D Animation – Special Effects - Creating Animation.						
UNIT:III		3D Animation			6 HOURS	
3D Animation & its Concepts – Types of 3D Animation – Skeleton & Kinetic3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation						

UNIT: VI	Motion & Scripting	6 HOURS
Motion Caption – Formats – Methods – Usages – Expression – Motion Capture Software’s – Script Animation Usage – Different Languages of Script Animation Among the Software.		
UNIT : V	Story Telling	6 HOURS
Concept Development –Story Development –Audio & Video – Color Model –Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Assignment, Seminar, and lab experiments		
	TOTAL LECTURER HOURS	32 HOURS
Text Books(s) :		
1	Steve Roberts, Animation Techniques, The Crowood Press Ltd, 2021	
2	Julia Peguet, Secrets of the Animator, CRC Press Edition, 2022	
3	Philip Carrera, Adobe Flash Animation: Creative Storytelling for Web and TV, Jones and Bartlett Publishers, 2010	
Reference Book(s) :		
1	Isaac V. Kerlow, The Art of 3D Computer Animation and Effects, Wiley 2009	
2	Mark Smith, The Art of Flash Animation: Creative Cartooning, O’Reilly, 2007	
3	E. A. Vander Veer, Chris Grover, Flash CS3: The Missing Manual, O'Reilly, 2007	
Web Reference(s):		
1	https://www.adobe.com/creativecloud/animation/discover/animation.html	
2	https://www.adobe.com/in/learn/animate	
3	https://www.animatorisland.com/animation-tutorial-for-beginners/watch-now/	
Course Designed By: Dr. R.VADIVEL		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	L
CO3	S	S	M	S	S	S	S	S	S	S
CO4	L	M	L	L	S	M	S	S	S	S
CO5	M	L	M	S	L	S	S	S	L	M

*S-Strong; M-Medium; L-Low

Course code	25IT2J2	EMBEDDED SYSTEMS AND WIRELESS SENSOR NETWORKS FOR IOT	L	T	P	C
Course:		JOB ORIENTED COURSE	2	-	-	-
Pre-requisite			Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1	Establishing basic concepts and key components of Internet of Things.					
2	Hands-on training in handling IoT building blocks.					
3	Understanding the interaction between cloud computation and sensors.					
Expected Outcomes :						
After completion of the course, the students are able to						
1	Understand the Embedded system					K2
2	Understand the Wireless Sensor network					K2
3	Explore the tools on Embedded system and Wireless Sensor Networks					K3
4	Troubleshooting the errors while implementing IoT for practical applications.					K4
5	Establishing the usage of commercially available components.					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT : I		IoT Basics			6 HOURS	
IoT Overview, 2Demo HTTP Web Server, Preparing Sensor Node						
UNIT : II					6 HOURS	
Creating Own Web Server, Experiment Thingspeak cloud server, Experiment Freeboard Cloud server						
UNIT : III		MQTT			6 HOURS	
Experiment MQTT IBM CLOUD, Experiment MQTT Eclipse cloud mobile app, Experiment Sending Email						
UNIT: IV		WSN			6 HOURS	
Experiment SMS Alert, Experiment Wireless Sensor Network, Project WSN						
UNIT: V		PUBLIC CLOUD			6 HOURS	
Experiment Pub Nub cloud server, Project Preparation						
UNIT : VI		Contemporary Issues			2 HOURS	
Seminar, Assignment and Case studies						
		TOTAL LECTURE HOURS			32 HOURS	

Text Book	
1	Building Blocks for IoT Analytics Internet-of-Things Analytics by MONCEF GABBOUJ, THANOS STOURAITIS, 2017, River Publishers
Reference Book(s):	
1	Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies by Dimitrios Serpanos, Marilyn Wolf, 2018, Springer
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	Introduction to internet of things By Prof. Sudip Misra, IIT Kharagpur
Course Designed by Dr. W.RoseVaruna	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	L	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	L
CO3	S	S	M	S	S	S	S	S	S	S
CO4	L	M	L	L	S	M	S	S	S	S
CO5	M	L	M	S	L	S	S	S	L	M

*S-Strong; M-Medium; L-Low

Course code	25IT3V1	ETHICAL HACKING AND CYBER FORENSICS	L	T	P	C
Core/Elective/Supportive		VALUE ADDED COURSE	2	-	-	-
Pre-requisite		BASIC KNOWLEDGE ABOUT ELECTRONICS AND PROGRAMMING	Syllabus Version		2025-26	
Instructions : - The course can be conducted/taught by either a department faculty member or an Industrial person. - It is a Non-credit course - There are no internal marks and external marks. However, the examination will be conducted by the faculty member in charge of the course. - The examination will be conducted for a maximum 50 marks, and the marks should be submitted to the Controller of Examination. - Marks will not be reflected in the mark statement, since it is not calculated for the CGPA.						
Course Objectives:						
The main objectives of this course are to:						
1	Equip the student with basic knowledge to deal with Cyber security threats in real life scenario.					
2	Hands-on training Ethical Hacking.					
3	Understanding the Cyber security measures.					
Expected Outcomes :						
After completion of the course the students are able to						
1	Understand the cyber attacks				K2	
2	Explore the security tools				K2	
3	Explore the techniques to prevent cyber attack				K3	
4	Take prevention measures for cyber attack				K4,K5	
5	Get a cyber security jobs IT/ITES industries				K6	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit : I		Cyber Security Introduction	6 HOURS			
Introduction to Cyber Security- The Hacking Impacts and its Framework - Reconnaissance - System Security - Process of Information Security - Risk Analysis in Cyber Security.						
Unit : II		Cyber Security & Kali Linux	6 HOURS			
Cyber Security Methodologies and setting up Lab for Cyber Security - Introduction to Firewall - Virtualization – VmWare & Virtual Box Installation - Lab Setup for Cyber Security - Kali Linux Overview.						

Unit : III	Cyber Security and Web Security	6 HOURS
Ethical Hacking & cyber Security methodologies - Introduction to ethical hacking - Types of Hackers - Metasploit tool for Hacking - Social Engineering Tools - Kali linux Commands. Web Hacking & Security - Web Server Overview - Domain , HTTP , DNS , URL - Common Vulnerabilities - OSINT - Reporting POC.		
UNIT: IV	Mobile Pentesting	6 HOURS
Mobile Pentesting & Wireless Security - Introduction to wifi network and Pentesting - Wifi Data Collection and analysis - WIFI attack and Security - Mobile App Pentesting - Reporting Tools for Mobile Pentesting.		
Dark web and Deep Web - Introduction to Darknet - Lab Setup for Darknet and Deep web Tor Browser and Accessing Darknet & Deepweb - Darknet Hosting & Search Engine - Protection against Darknet Website		
UNIT: V	Pen Testing & Bug Hunting	6 HOURS
Pen testing & Bug Hunting - Introduction to Pentesting - Installation of Burp Suite Tool - Nessus Tool for Pentesting - Android Forensics - Open Source Intelligence .		
Cyber Forensics- Introduction to Digital Forensics - Process of Forensics Investigation - Imaging of Operating system - Digital Forensics Analysis - Anti-Forensics Techniques & Detection		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Assignment, Seminar, and Case studies		
	TOTAL LECTURE HOURS	32 HOURS
Text Book(s)		
1	Desai, M. M., Hacking for Beginners: A beginners guide to learn ethical hacking, 2010	
2	Johnny long, Kali Linux Revealed ,Mastering the Penetration Testing Distribution,2021	
3	Henderson. L., Tor and the Dark Art of Anonymity, 2015, Van Haren Publishing.	
4	Britz, M. Computer forensics and cyber crime: An introduction, 2013,Pearson.	

Reference Book	
1	Engelbreton, P., The basics of hacking and penetration testing: Ethical hacking and penetration testing made easy, Syngress, 2011
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106106129
Course Designed by Dr. T.Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25IT4V2	UI/UX DESIGN	L	T	P	C
Core/Elective/Supportive		VALUE ADDED COURSE	2	-	-	2
Pre-requisite		BASIC PROGRAMMING	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. Learn Better user interface design						
2. Design the front end in effective manner						
3. Explore the opportunities on the front end designer						
Expected Course Outcomes:						
On the successful completion of the course, students will be able to:						
1	Understand the foundation of Screen design				K1,K2	
2	Understand the foundation of user interface design				K1,K2	
3	Apply user interface design				K3,K4	
4	Design and develop user interface design				K4	
5	Get a job on front end designer				K6	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT : I	FOUNDATIONS OF SCREEN DESIGN				6 HOURS	
UI vs. UX Design – Core Stages of Design Thinking – Divergent and Convergent Thinking -Brainstorming and Gamestorming – Observational Empathy						
UNIT :II	FOUNDATIONS OF UI DESIGN				6 HOURS	
Visual and UI Principles – UI Elements and Patterns – Interaction Behaviors and Principles -Branding – Style Guides						
UNIT : III	WIREFRAMING, PROTOTYPING AND TESTING				6 HOURS	
Sketching Principles – Sketching Red Routes – Responsive Design – Wireframing – Creating Wireflows – Building a Prototype – Building High - Fidelity Mockups – Designing Efficiently with Tools – Interaction Patterns – Conducting Usability Tests – Other Evaluative User Research Methods -Synthesizing Test Findings – Prototype Iteration						
UNIT : IV	UX PROCESS AND PROJECTS				6 HOURS	
UX Improvement Process - UX Delivery Process - UX Projects – UX Tools						
UNIT : V	RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE				6 HOURS	
Identifying and Writing Problem Statements – Identifying Appropriate Research Methods – Creating Personas – Solution Ideation – Creating User Stories – Creating Scenarios – Flow Diagrams – Flow Mapping – Information Architecture.						
UNIT : VI	CONTEMPORARY ISSUES				2 HOURS	
Assignment, Seminar and Case Studies						
		TOTAL LECTURE HOURS			32 HOURS	

Text Book(s)	
1	Brian Peel, UI UX Design: A Beginner's Guide to Mastering Layouts, Interactions, and User Testing, 2024
2	Don Norman, The Design of Everyday Things, Basic Publisher, 2013,
Reference Book	
1	Irene Pereyra, Universal Principles of UX, Rockport Publisher, 2023
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.edureka.co/blog/ui-ux-design-tutorial/
2	https://developer.android.com/design/ui
3.	https://onlinecourses.nptel.ac.in/noc21_ar05/
Course Designed by Dr. T.Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	L	S	S	L	S	S	M
CO3	L	M	S	S	S	S	L	S	S	S
CO3	L	L	S	S	S	S	S	S	S	S
CO4	M	M	S	S	S	S	L	M	S	S
CO5	M	M	S	S	S	S	M	M	S	M

*S-Strong; M-Medium; L-Low

Course code	25ITGS1	INDUSTRY 4.0	L	T	P	C
Core/Elective/Supportive		Supportive	2	-	-	2
Pre-requisite		Basic Knowledge on Big Data, and Artificial Intelligence	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. At the end of completing this course, students will have knowledge on Industry 4.0,						
2. Need for digital transformation and the following Industry 4.0 tools:						
3. Empower the students with Industry 4.0						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the need of Industry 4.0.					K2
2	Analyse the usage of Artificial Intelligence.					K4
3	Understand the Evolution of Big Data.					K2
4	Implement various applications in Big Data.					K5
5	Analyse the tools to perform Analytics.					K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
INDUSTRY 4.0			6 HOURS			
Need – Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI).						
UNIT:II						
ARTIFICIAL INTELLIGENCE			6 HOURS			
Artificial Intelligence: Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI -The AI - Environment - Societal Influences of AI – Application Domains and Tools						
UNIT:III						
INTRODUCTION TO BIG DATA			6 HOURS			
Evolution - Data Evolution - Data : Terminologies - Big Data Definitions - Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - Big Data Components : Big Data Characteristics - Big Data Processing Frameworks						
UNIT:IV						
BIG DATA APPLICATIONS			6 HOURS			
Big Data Applications - Big Data Tools - Big Data Domain Stack : Big Data in Data Science – Big Data in IoT - Big Data in Machine Learning - Big Data in Databases - Big Data for Industry -Big Data Roles and Skills -Big Data Roles - Learning Platforms						
UNIT:V						
APPLICATIONS AND TOOLS OF INDUSTRY 4.0			6 HOURS			
Applications Of IoT – Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society: Impact on Business, Government, People.						

UNIT:VI	CONTEMPORARY ISSUES	2 HOURS
Expert Lectures, Online Seminars – Webinars		
	TOTAL LECTURE HOURS	32 HOURS
Text Book		
1	P. Kaliraj, T. Devi, Higher Education for Industry 4.0 and Transformation to Education 5.0, 2020	
Reference Book		
1	V. Bhuvaneswari, T. Devi, “Big Data Analytics: Scitech Publisher , 2018	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://onlinecourses.nptel.ac.in/noc22_cs52/preview	
2	https://onlinecourses.nptel.ac.in/noc22_cs56/preview	
3	https://onlinecourses.swayam2.ac.in/arp20_ap10/preview	
4	https://onlinecourses.nptel.ac.in/noc22_cs53/preview	
Course Designed By: Dr. T.RAMESH		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	S	S	S	M	S	M	S
CO3	L	S	L	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	M	S	M	M
CO4	L	M	M	M	S	S	M	S	M	M
CO5	L	M	M	M	S	S	M	S	M	M

*S-Strong; M-Medium; L-Low

Course code	25ITGS2	PYTHON PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Supportive	2	-	-	2
Pre-requisite		Knowledge about the Internet and any one of the Scripting Languages	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to: 1. Understand the basics of Python Programming 2. Get a Job in the IT industry as a python programmer 3. Use Python programming in their research						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basics of Python Programming					K2
2	Exposure to python list, tuple and dictionary					K2
3	Design and Develop Python Programming					K3
4	Get a job in the IT industry as a Python Programmer					K6
5	Work as a freelance Python Programmer					K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:I						
Introduction to Python			6 HOURS			
Introduction to Python : Python interpreter - Overview of programming in Python - Python built-in types - Arithmetic in Python - Program input and Program output- Variables and assignment.						
UNIT:II						
Control Statements and Strings Operations			6 HOURS			
Control Statements: -if statements - while statement -for statements Strings and string operations						
UNIT:III						
List, Dictionary and Tuples			6 HOURS			
List basics - List operations - Dictionaries - Dictionary basics and Tuples -						
UNIT:IV						
Function and Exception Handling			6 HOURS			
Functions - formal arguments - variable-length arguments - Exceptions - detecting and handling exceptions.						
UNIT:V						
File Handling			6 HOURS			
Files and input/output - reading and writing files - methods of file objects - using standard library functions for file handling						
UNIT:VI						
CONTEMPORARY ISSUES			2 HOURS			
Expert lectures, online seminars – webinars						
TOTAL LECTURE HOURS			32 HOURS			

Text Book	
1	Amit Ashok Kamthane and Ashok N. Kamthane, “ Python Programming”, McGraw Hill Education; First edition, 2018
Reference Books	
1	Python Tricks, A Buffet of Awesome Python Features, Dan Bader, 2017
2	Harsh Bhasin, Python for Beginners, New Age International (P) Ltd Publishers, 2017
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	http://docs.python.org/tutorial/
2	https://nptel.ac.in/courses/106/106/106106182/
Course Designed By: Dr.T.RAMESH.	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	S	S	S	M	S	M	S
CO3	L	S	L	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	M	S	M	M
CO4	L	M	M	M	S	S	M	S	M	M
CO5	L	M	M	M	S	S	M	S	M	M

*S-Strong; M-Medium; L-Low

Course code	25ITGS3	INTRODUCTION TO INTERNET OF THINGS	L	T	P	C
Core/Elective/Supportive		Supportive	2	-	-	2
Pre-requisite		Basic knowledge of Electronics , hardware, And Programming in C	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are:						
1. To gain insight about the architecture and enabling technologies of Internet of Things						
2. To understand Arduino micro controller and IDE						
3. To develop simple IoT Applications for different domains						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
CO1	To learn the importance of smart objects and smart environment					K1
CO2	To understand and use the microcontroller and various sensors					K2
CO3	To create programs using Arduino IDE and extract data					K3
CO4	To perform WiFi data communications, remote data storage in cloud, and handle the data using web applications					K3,K4
CO5	To identify potential problems and develop solutions using IOT					K5,K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT:1						
Introduction to IoT			6 HOURS			
Introduction to IOT - Enabling technologies of IOT - Physical and logical design of IoT Application domains of IoT: Home automation – Cities – Environment – Energy – Industry – Agriculture – Transportation - Health care & Lifestyle.						
UNIT:2						
Basic Electronics for IoT			6 HOURS			
Understanding basic electronic components and power elements Electric Charge, Resistance, Current and Voltage – Resistors, Capacitors, Diodes, LED, Potentiometer, circuit boards - Analog and digital circuits – Microcontrollers – Electronic Signals – A/D and D/A Conversion – Pulse Width Modulation						
UNIT:3						
Sensors and Devices			6 HOURS			
Understanding Sensors and Devices - Understanding the Inputs from Sensors - Working with Temperature Sensors -Working with Ultrasound Sensor -Working with humidity sensor - Working with Motion Sensor - Working with IR Sensor - Working with Proximity Sensor - Working with Accelerometer and vibration sensor.						
UNIT:4						
Medical Sensors and Actuators			6 HOURS			
Understanding Medical Sensors: Flow Sensor - Optical Sensor - Body Temperature Sensor - Blood Pressure Sensor -Airflow sensor (breathing) - Patient position sensor (accelerometer) - UD - Annexure No.55A1 - Pulse and oxygen in blood sensor (SPO2) - Galvanic skin response (GSR - sweating) sensor.						
Actuators :Activating LED Lights - Activating Relay - Activating Buzzer - Running DC Motors - Running Stepper Motors and Servo Motors.						

UNIT:5		Data Communication from IoT Devices	4 HOURS
Communication Devices for IoT - Communication Principles to Transfer the data from IOT Devices; Using WIFI to Transfer the data from IOT Sensor			
UNIT:6		Contemporary Issues	2 HOURS
Expert lectures, online seminars – webinars			
		Total Lecture hours	32 HOURS
Text Book(s)			
1	ArshdeepBahga, Vijay Madiseti, ‘Internet of Things: A Hands-On Approach’, Universities Press, 2015.		
2	Boris Adryan, Dominik Obermaier, Paul Fremantle, ‘The Technical Foundations of IoT’, Artech Houser Publishers, 2017.		
3	Michael Margolis, “Arduino Cookbook” 2nd Edition, O'Reilly Media, 2012.		
4	Marco Schwartz, ‘Internet of Things with ESP8266’, Packt Publishing, 2016		
Reference Books			
1	Charles Platt, “Make Electronics – Learning by discovery”, O'Reilly Media, 2015.		
2	Michael Miller, “The Internet of Things,” Pearson India, 2015.		
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]			
1	Introduction to IOT, https://nptel.ac.in/courses/106/105/106105166/		
Course Designed By: Dr. T.RAMESH.			

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	S	S	S	M	S	M	S
CO3	L	S	L	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	M	S	M	M
CO4	L	M	M	M	S	S	M	S	M	M
CO5	L	M	M	M	S	S	M	S	M	M

*S-Strong; M-Medium; L-Low

Course code	25ITGS4	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	L	T	P	C
Core/Elective/Supportive	Supportive		2	-	-	2
Pre-requisite	Basic knowledge on AI and ML		Syllabus version		2025-26	
Course objectives						
1. To understand artificial intelligence						
2. To understand machine learning						
3. To familiar with AL & ML algorithms						
Expected Course Outcomes:						
On the successful completion of the course						
1	Students will also be able to understand basics of AI					K1
2	To get exposure to students on the machine learning					K2
3	To understand the basics of supervised learning and Unsupervised Learning					K3
4	Students will Apply AI & ML algorithms to solve the problems of complexity					K4
5	To get a job in the AL & ML domain					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
UNIT :I	ARTIFICIAL INTELLIGENCE				6 HOURS	
Overview of Artificial Intelligence: importance of knowledge-knowledge based systems-knowledge organization-knowledge manipulation.						
UNIT:II	SUPERVISED LEARNING - I				6 HOURS	
Linear Models for Regression – Linear Basis Function Models – Bayesian Linear Regression– Common Regression Algorithms – Simple Linear Regression – Multiple Linear Regression						
UNIT:III	SUPERVISED LEARNING – II				6 HOURS	
Linear Models for Classification – Common Classification Algorithms – k-Nearest-Neighbors – Decision Trees – Random Forest model – Support Vector Machines.						
UNIT:IV	UNSUPERVISED LEARNING - I				6 HOURS	
Mixture Models and EM – K-Means Clustering – Dirichlet Process Mixture Models – Spectral Clustering – Hierarchical Clustering						
UNIT:V	UNSUPERVISED LEARNING – II				6 HOURS	
The Curse of Dimensionality –Dimensionality Reduction – Principal Component Analysis – Latent Variable Models(LVM).						
UNIT: VI	CONTEMPORARY ISSUES				2 HOURS	
Expert lectures, online seminars – webinars, Latest Development / Topics in AI/ML						
TOTAL LECTURE HOURS					32 HOURS	
Text Book						
1	Dan W.Patterson “ Introduction to Artificial Intelligence and Expert System” Prentice Hall of India 2002					

Reference Books	
1	Ethempaydin, “Introduction to Machine Learning”, Third Edition, Prentice Hall of India, 2015
2	Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006
3	Stephen Marsland, “Machine Learning – An Algorithmic Perspective”, Second Edition, CRC Press, 2014
4	Fabio Nelli, “Python Data Analytics with Pandas, Numpy, and Matplotlib”, Second Edition, Apress, 2018.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
Course Designed By: Dr. T. RAMESH	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	S	S	S	M	S	M	S
CO3	L	S	L	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	M	S	M	M
CO4	L	M	M	M	S	S	M	S	M	M
CO5	L	M	M	M	S	S	M	S	M	M

*S-Strong; M-Medium; L-Low

Course code	25ITGS5	OFFICE AUTOMATION AND ICT TOOLS	L	T	P	C
Core/Elective/Supportive		Supportive	2	-	-	2
Pre-requisite		Basic Computer Knowledge and Operating System	Syllabus Version		2025-26	
Expected Course Outcomes (COs)						
After the completion of this course, the students will be able to:						
1	Demonstrate proficiency in using office suite applications such as Microsoft Office for Word Processing.					
2	Demonstrate proficiency in using office suite applications such as Microsoft Office for Power Presentations.					
3	Demonstrate proficiency in using office suite applications such as Microsoft Office for Spread Sheets.					
4.	Understand and utilize electronic signature tools such as DocuSign or Adobe Sign for digitally signing documents.					
5.	Familiarity with Video conferencing software for online meetings and webinars.					
Expected Course Outcomes :						
On the successful completion of the course, student will be able to						
1	Understand the need of Industry 4.0				K2	
2	Analyse the usage of Artificial Intelligence				K4	
3	Understand the Evolution of Big Data				K2	
4	Implement various applications in Big Data				K5	
5	Analyse the tools to perform Analytics				K4	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit: I	Word Processing			6 HOURS		
Introduction - Creating, opening and closing documents, Working with multiple documents, Saving documents, Save an existing file under another name, Locating the components of the Writer window, Writer toolbars and ruler, Adjusting the application settings, Adding content to Writer Documents, Working with text, Editing Content, Formatting Documents, Text Formatting, Paragraph Formatting, Text alignment, Tabs and its types, Placing text at the tab position, Paragraph spacing, Working with lists, Paragraph borders and shading, Creating and Applying Styles, Adding tables, Adding data to a table, Deleting a table, Add and delete columns and rows, Modifying columns and rows, Inserting images, Modifying images, Resize an image and charts, Mail Merge, Preparing the documents, Creating the main document, Creating the data source, Document formatting.						
Unit :II	Spread Sheets			6 HOURS		
Introduction to Spreadsheets, Development of the spreadsheet, Design considerations for spreadsheet documents, Creating, opening, and closing spreadsheets, Working with multiple spreadsheets, Saving spreadsheets, Locating the components of the Calc window, Calc toolbars,						

Adjusting the application settings, Adding content to Calc spreadsheets, Working with cells, Selecting cells and cell ranges, Entering data in cells, Numerical data, Date format of data, Sorting data, Formatting appearance, Copying and Moving cells, Working with rows and columns, Formulas and Functions, Arithmetic formulas, Arithmetic operators, Functions, Cell ranges, Charts and graphs, Types of Charts, Creating charts from cell data, Modifying a chart, Preparing spreadsheets for output, Setting up a worksheet for printing, Printing worksheet.		
Unit : III	Presentations	6 HOURS
Introduction to Presentations, Design principles, Purpose of the Presentation, The Design Process, Graphics and illustrations, Working with Presentations, Window Layout, Opening an Existing Presentation Using the File Menu, Saving a Presentation, Saving a Presentation in Different Formats, Creating a New Presentation, Using Pre-defined Presentation Templates in Presentation, Creating a Presentation from Scratch, Slide Layouts, Adding, Copying and Deleting Slides, Creating and Applying Presentation Views, Creating a Master for Presentation, Adding a Graphic or Object, Adding Text to Slides, Enter Text into Placeholders, Title Placeholder, Text Placeholder, Adding Text in Outline View, Adding a Textbox to a Slide, Copy, Move and Delete Text and Text Boxes, Formatting Text, Work with Tables in Presentations , Inserting Charts, Different Chart Types, Identifying the Parts of a Chart, Inserting a Simple Chart, Importing Charts and Tables from a Spreadsheet, Working with Graphics, Graphical Object, Inserting Clip Art, Inserting an Image from File, Using the Art Gallery to Draw Objects, Move/Delete/Copy a Selection of Objects, Preparing your Presentation, Animation Effects on Text and Objects, Add Presenter Notes to Slide.		
UNIT : IV	Collaboration & Communication and Electronic Signature	6 HOURS
Microsoft Teams – Zoom – DocuSign – Adobe Sign		
UNIT : V	Social Networks for Education	6 HOURS
LinkedIn – Instagram – Facebook – Twitter		
UNIT : VI	CONTEMPORARY ISSUES	2 HOURS
Assignment, Seminar and Case Studies		
	TOTAL LECTURE HOURS	32 HOURS
Text Books :		
1	Ramesh Bangia, “Learning Microsoft Office 2010”, Khanna Publishers	
2	Bittu Kumar, Social Networking, V&S Publishers, 2012	
3	Jayan S D, Electronic Signature, CBS Publisher, 2011	

Reference Book:	
1	Satish Jain, Shashi Singh, M. Geetha Iyer, “Bpb'S Computer Course Windows 10 With Ms Office 2016”, BPB Publications.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://baou.edu.in/assets/pdf/BSCIT_103_slm.pdf
2	https://www.ebookbou.edu.bd/Books/Text/SST/DCSA/dcsa_1302/Unit-02.pdf
3	https://www.msuniv.ac.in/images/e-content/6.Computer%20%20Fundamentals%20and%20Office%20Automation.pdf
Course Designed By: Dr.T.Ramesh	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	S	S	S	M	S	M	S
CO3	L	S	L	S	S	S	M	S	M	S
CO3	S	S	S	S	S	S	M	S	M	M
CO4	L	M	M	M	S	S	M	S	M	M
CO5	L	M	M	M	S	S	M	S	M	M

*S-Strong; M-Medium; L-Low