DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.

CIRCULAR NO.SU/Revised B.Sc./NEP/72/2024

It is hereby inform to all concerned that, the Revised syllabi prepared by the Board of Studies/Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technology, **Academic Council at its meeting held on 08 April 2024 has accepted** the following **Revised syllabi of Bachelor of Science** under the Faculty of Science & Technology **as per Norms of National Education Policy-2020 and as per Government Letter dated 13 March 2024** run at the Affiliated Colleges, Dr.Babasaheb Ambedkar Marathwada University as appended herewith.

Sr.No.	Courses	Semester
1.	B.Sc.Botany	Ist and IInd semester
2.	B.Sc.Biotechnology	Ist and IInd semester
3.	B.Sc.Zoology	Ist and IInd semester
4.	B.Sc.Agrochemical and Fertilizer	Ist and IInd semester
5.	B.Sc.Geology	Ist and IInd semester
6.	B.Sc.Environmental Science	Ist and IInd semester
7.	B.Sc.Home Science	Ist and IInd semester
8.	B.Sc.Diary Science and Technology	Ist and IInd semester
9.	B.Sc.Automobile Technology	Ist and IInd semester
10.	B.Sc.Physics	Ist and IInd semester
11.	B.Sc.Chemistry	Ist and IInd semester
12.	B.Sc.Analytical Chemistry	Ist and IInd semester
13.	B.Sc.Polymer Chemistry	Ist and IInd semester
14.	B.Sc.Electronics	Ist and IInd semester
15.	B.Sc.Forensic Science & Cyber Security	Ist and IInd semester
16.	B.Sc.Microbiology	Ist and IInd semester
17.	B.Sc.Fisheries Science	Ist and IInd semester
18.	B.Sc.Mathematics	Ist and IInd semester
19.	B.Sc.Forensic Science	Ist and IInd semester
20.	B.Sc.Information Technology	Ist and IInd semester
21.	B.Sc.Horticulture	Ist and IInd semester
22.	B.Sc.Networking & Multimedia	Ist and IInd semester
23.	B.Sc.Biochemistry	Ist and IInd semester
24.	B.Sc.Industrial Chemistry	Ist and IInd semester
25.	B.Sc.Bioinformatics	Ist and IInd semester

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26.	**B.Sc.Instrumentation Practice**	**Ist and IInd semester**
27.	**B.Sc.Non-Conventional and Conventional Energy**	**Ist and IInd semester**
28.	**B.Sc.Statistics**	**Ist and IInd semester**
29.	**Bachelor of Computer Application**	
30.	**B.Sc.Computer Science (Degree)**	**Ist and IInd semester**
31.	**B.Sc.Computer Science (Optional)**	**Ist and IInd semester**

This is effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.SU/2024/25588-96
Date:- 29.04.2024.

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Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,
2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

1] The Director, Board of Examinations & Evaluation, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
2] The Section Officer,[B.Sc.Unit] Examination Branch, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
3] The Programmer [Computer Unit-1] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
4] The Programmer [Computer Unit-2] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
6] The Public Relation Officer, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
7] The Record Keeper, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

Dr. Babasaheb Ambedkar Marathwada University,
Chhatrapati Sambhajinagar- 431001

B.Sc. Degree Programme

(Three Year / Four Years (Hons) /Four Years (Hons with Research)

Course Structure and Syllabus for B. Sc. 1st Year

(Revised)

(AS PER NEP-2020)

Subject : B.Sc. Information Technology

3 / 4 Year Degree Course

Effective from 2024-25

PREFACE

As we stand on the threshold of a new era in education, the dawn of the National Education Policy 2020 illuminates our path toward a holistic, inclusive, and progressive educational landscape. The Bachelor of Science (B. Sc.) curriculum outlined herein reflects the ethos and aspirations of this transformative policy, aiming to equip learners with the knowledge, skills, and values necessary to thrive in the dynamic world of the 21st century.

At its core, the National Education Policy 2020 envisions an educational framework that is learner-centric, multidisciplinary, and geared towards fostering creativity, critical thinking, and innovation. It emphasizes the integration of knowledge across disciplines, breaking down traditional silos to encourage holistic understanding and application of concepts. The Bachelor of Science (B. Sc.) curriculum embodies these principles by offering a diverse array of courses spanning various scientific domains, while also incorporating interdisciplinary studies to nurture well-rounded graduates capable of addressing complex challenges with agility and insight.

Furthermore, the curriculum is designed to promote experiential learning, research, and hands-on exploration, recognizing the importance of practical engagement in deepening understanding and cultivating real-world skills. Through laboratory work, field experiences, internships, and project-based learning opportunities, students will have the chance to apply theoretical knowledge in practical settings, develop problem-solving abilities, and cultivate a spirit of inquiry and discovery.

Integral to the National Education Policy 2020 is the commitment to inclusivity, equity, and access to quality education for all. The Bachelor of Science (B.Sc.) curriculum reflects this commitment by embracing diversity in perspectives, backgrounds, and experiences, and by fostering an inclusive learning environment where every student feels valued, supported, and empowered to succeed.

Moreover, the curriculum emphasizes the cultivation of ethical values, social responsibility, and global citizenship, instilling in students a sense of accountability towards society and the environment. By integrating courses on ethics, sustainability, and social sciences, the Bachelor of Science (B.Sc.) program aims to produce graduates who are not only proficient in their respective fields but also compassionate, ethical leaders committed to making a positive impact on the world.

As we embark on this journey of educational transformation guided by the National Education Policy 2020, the Bachelor of Science (B.Sc.) curriculum stands as a testament to our collective vision of a more equitable, inclusive, and enlightened society. It is our hope that through rigorous academics, innovative pedagogy, and unwavering dedication to excellence, we can inspire the next generation of scientists, scholars, and change-makers to realize their full potential and contribute meaningfully to the advancement of knowledge and the betterment of humanity.

Structure of B. Sc. (Three / Four Years Honours / Honours with Research Degree) Programme with Multiple Entry and Exit Options

Subject: B.Sc. (Information Technology)

BSc First Year: 1st Semester

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major (Core) M1 Mandatory	DSC-1	Introduction to C Programming	2		2		2+2 = 4
	DSC-2	Practical based on DSC-1		4		2	
Major (Core) M2 Mandatory	DSC-1	Fundamentals of DBMS	2		2		2+2 = 4
	DSC-2	Practical based on DSC-1		4		2	
Major (Core) M3 Mandatory	DSC-1	Foundations of Operating System	2		2		2+2 = 4
	DSC-2	Practical based on DSC-1		4		2	
Generic / Open Elective (GE/OE) (Choose any two from pool of courses) **It should be chosen compulsorily from the faculty other than that of Major**	GE/OE-1	To be chosen from other faculty	2		2		2
SEC (Skill Enhancement Courses) (Choose any one from pool of courses)	SEC-1	1. Basic Animation with Scratch 2. Graphic design using Canva	1		1		2
	SEC-2	Practical's based on SEC-1		2		1	
AEC, VEC, IKS	AEC-1	English (Common for all the faculty)	2		2		2+2 =4
	IKS-1	Choose any one from pool of courses	2		2		
OJT/ FP/CEP/CC/RP	CC-1	Health and Wellness (Common for all the faculty)		4		2	2
			13	**18**	**13**	**09**	**22**

GE/OE-1: **Fundamentals of Information Technology** (This course will be available for the students from other faculty)

BSc First Year: 2nd Semester

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major (Core) M1 Mandatory	DSC-3	Programming in C++	2		2		2+2 = 4
	DSC-4	Practical based on DSC-3		4		2	
Major (Core) M2 Mandatory	DSC-3	Advanced DBMS	2		2		2+2 = 4
	DSC-4	Practical based on DSC-3		4		2	
Major (Core) M3 Mandatory	DSC-3	Linux Operating System	2		2		2+2 = 4
	DSC-4	Practical based on DSC-3		4		2	
Generic / Open Elective (GE/OE) (Choose any two from pool of courses) **It should be chosen compulsorily from the faculty other than that of Major**	GE/OE-2	To be chosen from other faculty	2		2		2
VSC (Vocational Skill Courses) (Choose any one from pool of courses)	VSC-1	1) 3D creation suite - Blender 2) Interface design tool-Figma	1		1		2
	VSC-2	Practical's based on VSC-1		2		1	
AEC, VEC, IKS	AEC-1	English (Common for all the faculty)	2		2		2+2 =4
	VEC-1	Constitution of India (Common for all the faculty)	2		2		
OJT/ FP/CEP/CC/RP	CC-2	Yoga Education / Sports and Fitness (Common for all the faculty)		4		2	2
			13	**18**	**13**	**09**	**22**
Exit Option : Award of UG Certificate in 3 Majors with 44 credits and an additional 4 credits of core NSQF course / Internship OR continue with Major and Minor							

GE/OE-2 - **Cyber Security** (This course will be available for the students from other faculty)

Programme Educational Objectives (PEOs) :

Programme Educational Objectives (PEOs) for the Bachelor of Science Curriculum under the National Education Policy 2020:

1. **Mastery of Discipline-Specific Knowledge**: Graduates of the Bachelor of Science program will demonstrate a deep understanding of fundamental principles, theories, and methodologies in their chosen scientific discipline, enabling them to analyze complex problems, propose innovative solutions, and contribute to advancements in their field.

2. **Interdisciplinary Proficiency**: Graduates will possess the ability to integrate knowledge and skills from multiple scientific disciplines, fostering a holistic approach to problem-solving and innovation. They will be equipped to address multifaceted challenges by drawing upon diverse perspectives and methodologies.

3. **Critical Thinking and Analytical Skills:** Graduates will develop strong critical thinking abilities, enabling them to evaluate information rigorously, analyze data effectively, and make informed decisions based on evidence. They will demonstrate proficiency in applying logical reasoning and scientific methods to solve problems and generate new knowledge.

4. **Leadership and Innovation:** Graduates will demonstrate leadership qualities and entrepreneurial mindset, capable of initiating and driving positive change in their organizations and communities. They will exhibit creativity, resilience, and adaptability, harnessing innovation to address complex challenges and seize opportunities for growth and advancement.

5. **Global Citizenship and Cultural Sensitivity**: Graduates will possess a global perspective and cultural sensitivity, recognizing the interconnectedness of diverse communities and the importance of collaboration across borders. They will engage in cross-cultural dialogue, embrace diversity, and contribute to the advancement of knowledge and understanding on a global scale.

These Programme Educational Objectives serve as guiding principles for the Bachelor of Science curriculum, reflecting our commitment to nurturing well-rounded graduates who are prepared to excel in their careers, contribute to society, and lead meaningful lives in a rapidly changing world.

Programme Outcomes (POs) :

The National Education Policy (NEP) 2020 for India emphasizes several key aspects for Bachelor of Science (B.Sc.) programs, aiming to produce graduates who are not only well-versed in their respective disciplines but also equipped with skills necessary for holistic development and employability. While specific program outcomes may vary between institutions and disciplines within B.Sc. programs, here are some common outcomes aligned with NEP 2020:

- **PO1. Disciplinary knowledge:** Apply the knowledge of Information Technology, computing fundamentals, and a Computing specialization to the solution of complex problems.

- **PO2. Design/development of solutions:** Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

- **PO3. The IT professional and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional computing practice.

- **PO4. Environment and sustainability:** Understand the impact of the professional computing solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

- **PO5. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the computing practice.

- **PO6. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- **PO7. Communication:** Communicate effectively on complex Computing activities with the Information Technology community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

- **PO8. Project management and finance**: Demonstrate knowledge and understanding of the Information Technology and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO9. Lifelong learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

These program outcomes align with the broader goals of NEP 2020 to transform higher education in India and prepare students for the challenges and opportunities of the 21st century. Board of Studies designing B.Sc. curricula are encouraged to incorporate these outcomes into their program objectives and learning outcomes.

Programme Specific Outcomes (PSOs):

PSO1. **Knowledge of Computing Systems:** An ability to understand the principles and working of computer systems.

PSO2. **Project Development Skills:** An ability to understand the structure and development methodologies of software systems.

PSO3. **Software Development Skills:** Familiarity and practical competence with a broad range of programming language and open-source platforms.

PSO4. **Mathematical Skills:** An ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm.

PSO5. **Modern tools:** Create, select, and apply appropriate techniques, resources, and modern electronics and relevant IT tools including prediction and modeling to complex electronics technology related activities with clear understanding of the limitations.

B. Sc. IT

Semester - I

M1-DSC-1 : Introduction to C Programming

Total Credits : 02 Hours : 30 Hrs

Maximum Marks : 50

Learning Objectives of the Course:

i) To learn basic features
ii) To learn different decision making and looping statements
iii) To understand the concepts of array
iv) To learn modular applications in C using functions
v) To understand concepts of pointers and structures

Course Outcomes (COs) :

After completion of the course, students will be able to –

i) Implement basic C programs
ii) Develop and implement conditional and iterative statements
iii) Implement different types of arrays
iv) Develop and implement modular applications in C using functions
v) Implement structure and pointers

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction-** History of C language, Features, Character set, C Token, Identifier & Keywords, Variables, Constant & its types, various Operators, **Data Types -** int, char, float, double.	**10 Hrs**
II	**Structure of C Program -** I/O statements, Compilation & Execution of C program in Geany IDE C compiler /Turbo c compiler, Escape sequence characters, Decision making and looping Statements, ? : Operator, Loop interruption statements.	**10 Hrs**
III	**Arrays -** Introduction, Declaration & initialization, Accessing array elements, Types of arrays, **Function -** Introduction, defining function, Arguments, Function prototype, function calling & Returning value from function, Call by Value & Call by Reference, Recursion **Pointers -**Introduction, address (&) and indirection (*) Operators, Declaration and initialization of pointers, **Structure-** Introduction, Declaration & initializing structure, Accessing structure members, Nested structures.	**10 Hrs**

Text Books

1. Programming in C : E. Balagurusamy [Tata macgraw hill]
2. Spirit of "C" : Mullish Cooper

Reference Books:

1. Let us C : Y.P. Kanetkar [bpb publication]
2. C programming Language. By Brian W. Kernighan and Dennis M. Ritchie. Published by Prentice-Hall

M1-DSC-2: Practical based on DSC-1 (Introduction to C Programming)

Total Credits : 02 Hours : 60 Hrs
Maximum Marks : 50

Sample List of experiments to be carried out based on the course DSC-1

1	Simple program to demonstrate use of printf and scanf.
2	Program to find average of three numbers
3	Program to find area of circle
4	Program to Find largest number from two numbers
5	Program to check entered number is positive, negative or zero
6	Program to demonstrate switch case statement
7	Program to print odd numbers from 1 to N
8	Program to demonstrate nested loop
9	Program to print the Fibonacci Series
10	Program to demonstrate one dimensional array
11	Program to demonstrate two dimensional array
12	Program to find factorial of given number using function
13	Program for Swapping of numbers by using call by reference
14	Program to create structure student
15	Program to demonstrate pointers

M2: DSC-1 : Fundamentals of DBMS

Total Credits : 02 Total Contact Hours : 30 Hrs
Maximum Marks : 50

Learning Objectives of the Course:

i) To understand the fundamental concepts of database
ii) To understand user requirements and frame it in data model.
iii) To understand creations, manipulation and querying of data in databases.

Course Outcomes (COs) :

i) After completion of the course, students will be able to -
ii) Design data models, schemas and instances
iii) Design E-R Model for given requirements and convert the same into database tables.
iv) Implement SQL: Data definition, constraints, schema, queries and operations in SQL

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	1.1. Introduction 1.2. Levels of abstraction & data independence 1.3. Structure of DBMS 1.4. Users of DBMS 1.5. Advantages of DBMS 1.6. design process 1.7. Introduction to data models (E-R, Relational, Networkand Hierarchical model) 1.8. Conceptual design using ER data model (entities, attributes, entitysets, relations, relationship sets)	10 Hrs
II	2.1 Constraints (Key constraints, Integrity constraints, referential integrity, unique constraint, Null/Not Null constraint, Domain, Check constraint, Mapping constraints) 2.2 Overview of DB 2.3 Extended features – Specialization, Aggregation, Generalization 2.4 Pictorial representation of ER (symbols) 2.5 Structure of Relational Databases (concepts of a table) 2.6 Case Studies on ER model 2.7 Introduction to query languages 2.8 Basic structure 2.9 DDL and DML Commands	10 Hrs
II	3.1 Forms of a basic SQL query (Expression and strings in SQL) 3.2 Set operations 3.3 Aggregate Operators and functions 3.4 Date and String functions 3.5 Null values	10 Hrs

	3.6 Nested Sub queries 3.7 SQL mechanisms for joining relations (inner joins, outer joins and their types) 3.8 Views 3.9 Keys Concept with Examples: Candidate Keys and Super Keys, Algorithm tofind the super keys / primary key for a relation	

Text Books:

1. Abraham Silberschatz, Henry F Korth, S Sudarshan, Database System Concepts, McGraw-Hill, 6th Edition, 2010
2. Ramakrishnan, Gehrke, Database Management Systems, McGraw-Hill, 3rd Edition, 2003

Reference Books:

1. Elmasri, Navathe, Somayajulu, Fundamentals of Database Systems, Pearson Education, 4th Edition,2004.

M2: DSC-2 : Practical based on DSC-1 (Fundamentals of DBMS)

Total Credits : 02
Maximum Marks : 50

Total Contact Hours : 60 Hrs

List of practical to be conducted in Laboratories –

1.	Draw database & types of database using Smart Draw Tool
2.	Draw database & types of database using Smart Draw Tool.
3.	Draw 2 Tier- 3 Tier Architecture using Smart Draw Tool.
4.	Draw Schema Architecture with Smart Draw Tool.
5.	Draw DBMS detailed architecture with Smart Draw Tool.
6.	Draw Data Independence architecture using Smart Draw Tool.
7.	Draw Data models Category using Smart Draw Tool.
8.	Draw Specialization Generalization & Aggregation with Smart Draw Tool.
9.	Draw ER Diagram of College database, Railway Reservation Database, Hospital Management System and Bank Database with Smart Draw Tool.
10.	To study about the DDL commands.
11.	To study about the DML commands.
12.	To study about Aggregate Functions.
13.	To study about Set Operations.
14.	To study about Joins operations.
15.	To study about Views operations.

M3 - DSC-1 : Foundations of Operating System

Total Credits : 02
Maximum Marks : 50

Total Contact Hours : 30 Hrs

Learning Objectives of the Course:

i) To introduce students basic functioning of operating system.
ii) Explore core principles and concepts of operating systems.
iii) Explore concept of process and memory management.
iv) Explore concept of device management.
v) Explore concept of CPU scheduling.

Course Outcomes (COs) :

After completion of the course, students will be able to –

i) Gain a comprehensive understanding of the distinction between system software and application software.
ii) Grasp the diverse types of operating systems, their fundamental functions, and the evolutionary progression of OS, encapsulating advancements in functionality and compatibility over time.
iii) Gain insight into the concept of processes, process control blocks.
iv) Understand CPU Scheduling.
v) Understand device management.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to Operating System, Definition, classification of software, Functions of Operating System. Operating system as main component of system software, structure of OS, operating system as resource manager, types of OS-single and multiuser OS, various names of OS	10 Hrs
II	Process management- Concept of Process: Process State, Operation on Processes. File Management- Implementation of file system, disk Allocation methods- Contiguous, linked, indexed allocation Memory Management- concept, single contiguous memory management, relocatable partition memory management, fixed partition memory management, Fragmentation: Internal fragmentation, external fragmentation Page segmentation policies- concept, demand paging, page fault page replacement algorithm- Optimal, First-im-First-out, LRU approximation.	10 Hrs
III	CPU Scheduling and Device management: Introduction, Dedicated, Shared & Virtual Device, I/O devices, Storage devices, Device allocations, I/O Scheduler,	10 Hrs

	Types of Schedulers, Criteria for scheduling, Scheduling Algorithms-(FCFS), SJF, Round Robin scheduling, priority scheduling, Concept of Deadlock.	

Text Books:

1. G. Nutt, Operating System, Modern Operating System Concepts, 8th edition, John Wiley Publications 2008
2. "Operating System", By S.R.Sathe & Anil S.Mokhade , MacMillan Publication.
3. "Operating System", By Stuart E.Madnick, John J.Donovan.

Reference Books:

1. Operating System Concepts- A. Silberzchaz & P.B. Galvin, Addison – Wesley Publishing Company

M3 - DSC-2 : Practical based on DSC-1 (Foundations of Operating System)

Total Credits : 02 Total Contact Hours : 60 Hrs
Maximum Marks : 50

1.	Installation of Operating System. Installation of Linux operating system (any flavour) on virtual machine
2.	Installation of Windows operating system on virtual machine.
3.	Understand basic Operating system (Linux) commands. Working with Directories:(any five) pwd, cd, absolute and relative paths, ls, mkdir, rmdir
4.	Linux commands: Working with files: any 10 a. ps, top, kill, pkill, bg, fg, b. grep, locate, find, locate. c. date, cal, uptime, w, whoami, finger, uname, man, df, du, free, whereis, which. Compression: tar, gzip
5,	Windows (DOS) Commands – 1 a. Date, time, prompt, md, cd, rd, path. b. Chkdsk, copy, xcopy, format, fidsk, cls, defrag, del, move
6.	Windows (DOS) Commands – 2 a. Diskcomp, diskcopy, diskpart, doskey, echo b. Edit, fc, find, rename, set, type, ver
7.	Working with Windows Desktop and utilities a. Notepad b. Wordpad c. Paint d. Taskbar e. Adjusting display resolution f. Using the browsers g. Configuring simple networking h. Creating users and shares
8.	Working with Linux Desktop and utilities a. The vi editor. b. Graphics c. Terminal d. Adjusting display resolution e. Using the browsers f. Configuring simple networking g. Creating users and shares
9.	Installing utility software on Linux and Windows
10.	Implementation of Process and thread (Life cycle of process): (i) Process creation and Termination; (ii) Thread creation and Termination
11.	Write a Program to implement scheduling algorithm FCFS.

12.	Write a Program to accept list of process arrival time and display Gantt chart for FCFS.
13.	Write a Program to implement scheduling algorithm SJF.
14.	Write a Program to implement scheduling algorithm Round Robin.
15.	Write a Program to implement scheduling algorithm Priority scheduling.

SEC-1 : . Basic Animation with Scratch

Total Credits : 01
Maximum Marks : 50

Total Contact Hours : 15 Hrs

Learning Objectives of the Course:

i) To introduce students to animation concepts and techniques using Scratch programming.
ii) To provide students with the knowledge and tools to create their own animations and games using scratch.

Course Outcomes (Cos) :

After completion of the course, students will be able to –

i) thinking creatively, communicating clearly.
ii) analyzing systematically, using technologies fluently,
iii) collaborating effectively, designing iteratively, and learning continuously.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Animation:** Understanding the concept and history of animation,Overview of various animation techniques and styles,Introduction to key animation principles: squash and stretch, timing, anticipation, staging. **Introduction to Scratch:** Understanding the basics of Scratch programming environment, Familiarization with Scratch interface and blocks, Creating simple animations using Scratch sprites and background	5
II	**Animation Basics in Scratch** Introduction to basic animation concepts such as motion, costumes, and events. Creating movement with Scratch sprites using motion blocks, Exploring costume changes and sprite rotation for animation effects. **Adding Interactivity:** Incorporating user interaction through keyboard and mouse events, Introduction to variables for controlling animation parameters, Designing interactive animations and games with Scratch.	5
III	**Intermediate Animation Techniques in Scratch** **Advanced Motion and Effects:**	5

	Utilizing motion and glide blocks for smooth animation transitions. Introduction to visual effects such as fading, scaling, and changing colors. Applying sound effects to enhance animation experiences. **Character Animation:** Understanding character design and animation principles,Creating animated characters with multiple costumes and movements,Designing character-based games and stories in Scratch.	

Text Books:

1. "Scratch Programming Playground: Learn to Program by Making Cool Games" by Al Sweigart
2."Super Scratch Programming Adventure!: Learn to Program by Making Cool Games" by The LEAD Project.
3. "Coding Games in Scratch" by Jon Woodcock.

SEC-1 : Practical based on SEC-1	
Total Credits : 01 Maximum Marks : 50	Total Contact Hours : 30 Hrs

1	Set up Scratch Account Worksheet
2	Scratch Explore, Scratch Studio
3	Working with blocks
4	Work with Scratch Sound Worksheet
5	Adding Sound files
6	Working with Characters, scenes, scrolling
7.	Complete a small project
8.	Minimum 3 more practical on the basis of syllabus to improve the practical knowledge of students.

SEC-2 : . Graphic design using Canva

Total Credits : 01 Total Contact Hours : 15 Hrs
Maximum Marks : 50

Learning Objectives of the Course:

i) Understand fundamental principles of visual design.
ii) Develop advanced design skills and techniques.
iii) Apply learned principles and techniques to real-world design projects.

Course Outcomes (Cos) :

After completion of the course, students will be able to –

i) Create stunning graphics using Canva.
ii) Master photo-editing basics.
iii) Design complex graphic projects on Canva with confidence.
iv) Unlock creative potential and enhance your graphic design skills

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	**Introduction to Visual Design with Canva** **Understanding Visual Design Principles:** Elements of design (line, shape, color, texture, Principles of design (balance, contrast, emphasis, rhythm)Importance of visual hierarchy. **Introduction to Canva** Overview of Canva's interface and features, Basic tools and functionalities for creating designs, Understanding Canva's design templates and resources.	5
II	**Advanced Visual Design Techniques with Canva** **Designing with Canva:** Creating posters, flyers, social media graphics, and presentations, Utilizing Canva's typography and color tools effectively, Incorporating images and multimedia elements into designs. **Advanced Design Principles:** Gestalt principles and their application in design,Advanced color theory and color schemes Creating visual consistency and coherence in designs, Utilizing advanced features such as gradients, shadows, and filters,Incorporating custom fonts and brand assets into designs	5

	Collaborating with team members using Canva's sharing and commenting features	
III	**Design Project** **Designing for Different Platforms:** Tailoring designs for various social media platforms Designing for print and digital media Understanding responsive design principles **Design Project:** Students will undertake a comprehensive design project using Canva, focusing on a specific theme or topic,Emphasis on applying learned principles and techniques to create visually appealing and effective designs.	**5**

Text Books:

1. "Design for Hackers: Reverse Engineering Beauty" by David Kadavy

2"The Non-Designer's Design Book" by Robin Williams
3"Canva: Step-by-Step Guide to Design Anything" by Zoe Eva

SEC-2 : Practical based on SEC-2	
Total Credits : 01 Maximum Marks : 50	Total Contact Hours : 30 Hrs

1	Use Canva AI for Magic Media, Magic Media
2	Magic Eraser, Magic Edit, Magic Grab, Magic Expand
3	Magic Morph, Magic Write, Magic Design, Magic Animate, Instant Presentations
4	Magic Switch, Magic Eraser, Magic Edit, Magic Grab, Magic Expand, Magic Morph, Magic Instant Presentations
5	Write Magic Design, Magic Animate
6.	Make a small animation applying the studied commands
7.	Complete a project

This course will be available for the students from other faculty

GE/OE-1- Fundamentals of Information Technology

Total Credits : 02 Total Contact Hours : 30 Hrs
Maximum Marks : 50

Learning Objectives of the Course:

i) The main objective is to introduce IT in a simple language to all undergraduate students, regardless of their specialization.
ii) It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry.
iii) The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive medias, Internet basics etc. tools, allowing them to better understand and shape their digital productivity.

Course Outcomes (COs): At the end of this course, student should be able to

i) Understand basic concepts and terminology of information technology.
ii) Have a basic understanding of personal computers and their operations.
iii) Be able to identify issues related to information security. Effective Communication and Collaboration with productivity

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to Information Technology :Definition and scope of Information Technology (IT), Evolution of IT and its impact on society, Components of an IT system: hardware, software, data, network, Overview of computer organization and architecture, Introduction to computer software: system software and application Software	10 Hrs
II	Computer Fundamentals: input, processing, output, storage, Overview of computer memory and storage devices, Understanding data representation: binary, decimal, hexadecimal, Introduction to operating systems and their functions, Introduction to computer networks and the internet	10 Hrs
III	Software and Programming Concepts: Software categories: system software and application software, Basics of programming languages, high-level, low-level, and scripting languages, Introduction to algorithms and flowcharts	10 Hrs

Text Books:

1 "Information Technology: Principles and Applications" by A. S. Godbole.

2. "Information Technology Essentials: An Introduction to Information Technology" by O'Brien and Marakas.

Reference Books:

1. "IT Strategy: Issues and Practices" by James D. McKeen and Heather A. Smith.

B. Sc. IT

Semester - I I

M1-DSC-3 : Programming in C++

Total Credits : 02 Total Contact Hours : 30 Hrs
Maximum Marks : 50

Learning Objectives of the Course:

i) Introduces Object Oriented Programming concepts using the C++ language.
ii) Introduces the principles of data abstraction, inheritance and polymorphism
iii) Introduces the principles of virtual functions and polymorphism
iv) Introduces handling formatted I/O and unformatted I/O
v) Introduces exception handling

Course Outcomes (COs) :

After completion of the course, students will be able to -

i) Understand Principles of OOP's using C++
ii) Design and implement OOP programs using C++
iii) Understand Classes, Objects Inheritance and Polymorphism using C++
iv) Develop Object oriented programming Skills and gain practical experience
v) Handling exceptions to control errors

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to object-oriented programming, input-output in C++, strings, functions, default values in functions, recursion, namespaces, operators, arrays and pointers. Abstraction mechanism: Classes, private, public, member data, member functions, inline function, friend functions, static members, and references. Inheritance: Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class	10 Hrs
II	Constructor and destructor execution, base initialization using derived class constructors Polymorphism: Binding, Static binding, Dynamic binding, Static polymorphism: Function Overloading, Ambiguity in function overloading, Dynamic polymorphism: Base class pointer, late binding, method overriding with virtual functions, pure virtual functions, abstract classes. Operator Overloading: Unary and Binary Operator overloading.	10 Hrs
III	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration. Dynamic memory management, new and delete operators, object copying, copy constructor, assignment operator. Template: template classes, template functions. Namespaces: user defined namespaces, namespaces provided by library.	10 Hrs

Text Books:

1. Object Oriented Programming with C++ by E. Balagurusamy, McGraw-Hill Education (India)
2. ANSI and Turbo C++ by Ashokc N. Kamthane, Pearson Education
3. Programming in C++ By Dr. Sayyad Nisar Ali Razvi

Reference Books:

1.Big C++ - Wiley India

2.C++: The Complete Reference- Schildt, McGraw-Hill Education (India)

3.C++ and Object Oriented Programming – Jana, PHI Learning.

M1-DSC-4 : Practical Based on DSC-3 (C++)

Total Credits : 02
Maximum Marks : 50

Total Contact Hours : 60 Hrs

List of practical to be conducted in Laboratories: -

1. Write a C++ program to swap two numbers.
2. Write a C++ program to generate Fibonacci series.
3. Write a C++ program to perform string manipulation.
4. Write a C++ program to generate Prime numbers between 1 and 50.
5. Write a C++ program to perform matrix addition and multiplication.
6. Find the length of a string. Compare two strings, Concatenate two strings, Reverse a string, Copy a string to another location.
7. Write a C++ program to manipulate the class account using classes and function. A user should be able to perform the following functions.
    a. Deposit money
    b. Withdraw money
    c. Calculate the interest
    d. Check the total balance in his account.
8. Demonstrate All Types of Inheritance
9. Write a C++ program to overload a function to calculate volume of cube, cylinder and rectangular box.
10. Declare a class Demo that contains the following members.
11. Three data members for roll number, name and marks.
12. One default constructor to accept the values of the data members through keyboard.
13. One destructor member function.
14. A member function to display the contents of the data members.
15. Write a C++ program to demonstrate Polymorphism, Class templates and exception handling

M2: DSC-1 : Advanced Database Management System (ADBMS)

Total Credits : 02 Total Contact Hours : 30 Hrs
Maximum Marks : 50

Learning Objectives of the Course:

i) To teach fundamental concepts of RDBMS
ii) To teach database management operations
iii)To Be familiar with the basic issues of transaction processing and concurrency control
iv)To teach data security and its importance

Course Outcomes (COs) :
After completion of the course, students will be able to -

i) Design E-R Model for given requirements and convert the same into database tables.
ii) Use database techniques such as SQL & PL/SQL.
iii) Explain transaction Management in relational database System.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	1.1 Introduction to Relational-Database Design 1.2 Functional Dependency (Basic concepts) 1.3 Concept of Decomposition, Desirable Properties of Decomposition 1.4 Concept of normalization, Normal Forms (1NF,2NF ,3NF and BCNF)Examples. 1.5 Domain constraints, Referential Integrity 1.6 Introduction to PLSQL 1.7 Controlling the program flow, conditional statements, loops 1.8 Stored Procedures and Stored Functions 1.9 Handling Errors and Exceptions 1.10 Cursors and Triggers	10 Hrs
II	2.1 Describe a transaction, properties of transaction, state of the transaction. 2.2 Executing transactions concurrently associated problem in concurrent execution. 2.3 Schedules, types of schedules, concept of Serializability, Precedence graphfor Serializability. 2.4 Ensuring Serializability by locks, different lock modes, 2PL and itsvariations. 2.5 Basic timestamp method for concurrency, Thomas Write Rule. 2.6 Timestamps versus locking. 2.7 Deadlock and deadlock handling - Deadlock Avoidance (wait-die, wound-wait), 2.8 Deadlock Detection and Recovery (Wait for graph)	10 Hrs

II	3.1 Introduction to database security concepts 3.2 Methods for database security 3.3 Role base access control for multilevel security. 3.4 Use of views in security enforcement. 3.5 Failure classification 3.6 Recovery concepts 3.7 Log base recovery techniques (Deferred and Immediate update)	10 Hrs

Text Books:

1. Abraham Silberschatz, Henry F Korth, S Sudarshan, Database System Concepts, McGraw-Hill, 6th Edition, 2010
2. Database Management Systems, Raghu Ramakrishnan, Mcgraw-Hill Education

Reference Books:

1. Database Systems, Shamkant B. Navathe, Ramez Elmasri, PEARSON HIGHER EDUCATION
2. Fundamentals of Database Systems, By: Elmasri and Navathe, 4th Edition Practical PostgreSQL O"REILLY
3. Database Management Systems, Raghu Ramakrishna and Johannes Gehrke, McGraw-Hill Science/Engineering/Math; 3 edition, ISBN:9780072465631
4. Ramakrishnan, Gehrke, Database Management Systems, McGraw-Hill, 3rd Edition, 2003

M2: DSC-2 : Practical based on DSC-1 (ADBMS)

Total Credits : 02 Total Contact Hours : 60 Hrs
Maximum Marks : 50

List of practical to be conducted in Laboratories –

1 Practical based on DDL
2 Practicals based Accessing the Database
3 Practicals based on basic SQL
4 Practical based on DML Commands
5 Practical based on DCL and TCL Commands
6 Practicals based on intermediate and advanced Database
7 Practicals based on views
8 Write a query on every in Built Functions (Ex. On string, date etc.)
9 Practical using Nested Queries and Join Queries on multiple table
10 Set operators on multiple table
11 Study in built procedures and create user defined procedure
12 Study in built Function and create user defined Function
13 Create Triggers
14 Write a cursor
15 Writing simple transaction

M3- DSC-3 : Linux Operating System

Total Credits : 02 Total Contact Hours : 30 Hrs
Maximum Marks : 50

Learning Objectives of the Course:

i) To introduce students the basic knowledge of open source operating system such as Linux.
ii) To acquaint students about implementation of execution of Linux commands.
iii) To provide Installation of Linux Operating System.
iv) To acquaint students about Instalation of various open sources software on Linux platform.

Course Outcomes (COs) :

After completion of the course, students will be able to -

i) Upon successful completion of the course, the students will:
ii) To acquaint students with various Linux commands and installation of open source operating system.
iii) To cultivate implementation skill of open source operating system.
iv) To develop skills in managing software and system administration tool.
v) To prepare students for future courses having technical operating system knowledge.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Overview to Linux & Unix based operating systems Difference between Red Hat & Ubuntu, Ubuntu, History of Linux, Features of Linux, O.S. Linux Distribution, Architecture of Linux-kernel, shell, Tools and applications, Linux File System – file names, addressing of files, Directories or Files and their description, Types of Linux files, Linux Kernel, file permissions (file access modes), i-node number, Terminal window, command prompt.	10 Hrs
II	Linux commands : Command syntax, Command history, Feeding commands on prompt, ls, man, script, info, cd, pwd, cat, cp, rm, mv, mkdir, rmdir, finger, who, whoami, chmod, head, tail, page, more, nl, ln, chown, chgrp, date, cal, file, wc, cmp, tty, bc, sort, uniq, diff, comm, cut, paste, ps, kill, grep, type, spell, at, uname, nice, renice, less, free, stty, clear. Filters – vertical bar-pipe, tee , redirection I/O - <, >, >>, 2>, metacharacters.	10 Hrs
III	Installations :- Installation of Linux O.S., Commands - sudo, apt-get :- install, update, upgrade, remove, purge, autoremove, The differences between APT update and upgrade command. Installation of compilers for languages/packages – c, c++,java, JSP, MYSQL,KDE-office, PHP, R-programming, Pytohon, Geany ID, android installation, MYSQL and	10 Hrs

	MYSQL Workbench, etc. Installation of various destop - Gnome desktop, KDE Plasma Desktop, Cinnamon Desktop, LXQt Desktop	

Reference Books:

1. Official Ubuntu Book, 9th edition by by Mattew Helmke, Elizabeth Joseph, Jose Rey
2. Beginning Ubuntu Linux: From Novice to Professional (Third Edition) by Keir Thomas - Apress; Bk&CD-Rom edition (June, 2008)
3. Linux Bible : Boot Up to Fedora, KNOPPIX, Debian, SUSE, Ubuntu , and 7 Other Distributions by Christopher Negus - Wiley; 2 edition (January 31, 2006)
4. Ubuntu Unleashed by Andrew Hudson, Paul Hudson - Sams; 1st edition (August 29, 2006)

DSC-4 : Practical based on DSC-3 - (Linux Operating System)	
Total Credits : 02 Maximum Marks : 50	Total Contact Hours : 60 Hrs
Sample List of experiments to be carried out based on the course DSC-3. Three experiments can be carried out based on each unit. Teacher can also add experiments of their choice.	
1	Obtain the Red Hat/Ubuntu Linux distribution and install it on your laptop or desktop. Start the computer in-front and login to Ubuntu Linux, Get yourself familiarized with the Ubuntu GUI interface.
2	Practical based on Linux Commands *Basic.
3	Practical based on Linux Commands. *Advanced
4	Practical based on The Command Line Interface
5	Add Panel on desktop, on panel add menu bar and various applets.
6	Install the software/compiler/application ..... from software boutique/using sudo command in terminal window.
7	Install the printer (dot matrix/laser) on Computer system
8	Install the Gnome Desktop from terminal window on Computer system.
9	Install the KDE Plasma Desktop from terminal window on Computer System
10	Install Cinnamon Desktop from terminal window on computer system.make it look like windows-XP.
11	Install Geany IDE from terminal window/Software boutique. Write any promgram in ..... Programming laungage, compile and execute it. (c,c++)
12	Install MySQL/PHP from terminal window on computer system.
13	Install R Programming language from Treminal Window/Software Boutique on Computer System.
14	Install the Dolphin File Manager from Terminal Window and compaire it with Caja.
15	Install KDE-office open source office from Terminal window and compaire it with Libre Open Office.

VSC-1- 1) 3D creation suite - Blender

Total Credits : 01 Total Contact Hours : 15 Hrs

Maximum Marks : 50

Learning Objectives of the Course:

i. Students will learn the fundamentals of 3D modeling, texturing, lighting, animation, and rendering using Blender software

Course Outcomes (COs) : 1. Students will be able to create detailed 3D models, sculpt characters and objects

2. Create animations, add special effects, and much more.
3. They will be able to explore the extensive library of add-ons that can extend its functionality even further.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Overview of Blender interface and workspace, Navigation controls and basic operations Introduction to Blender's modeling, animation, and rendering capabilities, Introduction to 3D modeling concepts, Modeling simple objects: cubes, spheres, cylinders, Editing mesh objects: extrusion, beveling, subdivision	05 Hrs
II	Advanced 3D Modeling Techniques, Modeling complex objects: characters, vehicles, architecture Using modifiers for non-destructive modelling, Sculpting tools and techniques Introduction to materials and textures in Blender,UV unwrapping and texture mapping Procedural textures and texture painting	05 Hrs
III	Understanding lighting in Blender: lamps, sun, sky,Basic rendering settings and output formats, Rendering still images and animations, Introduction to animation principles, Keyframe animation: setting keyframes, interpolation, Animating objects and cameras, Rigging basics: creating armatures and bones, Weight painting and rigging characters, Character animation techniques: walk cycles, facial expressions	05 Hrs

Text Books:

1.Blender For Dummies" by Jason van Gumster - This book provides a comprehensive introduction to Blender, covering modeling, texturing, animation, rendering, and more.

2.The Complete Guide to Blender Graphics: Computer Modeling & Animation" by John M. Blain - This comprehensive guide covers all aspects of Blender, from modeling to animation to compositing, with step-by-step tutorials and explanations.

Reference Books:

1.Blender Foundations: The Essential Guide to Learning Blender 2.6" by Roland Hess - This book offers a structured approach to learning Blender, covering fundamental concepts and techniques for creating 3D graphics.

VSC-2- Practical Based on VSC-1 (1)

Total Credits : 01 Total Contact Hours : 30 Hrs

Maximum Marks : 50

List of practical to be conducted using Blender:

1	Setting up and installing Blender
2	Fundamentals of 3D modeling, editing, lighting, and animation
3	Building intricate 3D objects.
4	Create dynamic designs effortlessly.
5	Set up environment lighting to add realism and atmosphere to your scenes
6.	Adding multiple materials to your assets, enhancing their appearance and realism.
7.	Animation using keyframes, bringing life and movement to your 3D creations.
8.	Minimum 3 more practical on the basis of syllabus to improve the practical knowledge of students.

VSC-1- 2) Interface design tool-Figma

Total Credits : 01 Total Contact Hours : 15 Hrs

Maximum Marks : 50

Learning Objectives of the Course:

i.This course provides an introduction to Figma, a collaborative interface design tool used for creating user interfaces, prototypes, and design systems.
ii.Students will learn the fundamentals of interface design, prototyping, and collaboration using the Figma platform.

Course Outcomes (COs) : 1. Students will have a strong knowledge set and skills to get into the promising career opportunities in UX design.
2.Students will be able to create a product that is both aesthetically appealing and easy to interact with.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Overview of Figma interface and workspace, Creating an account and setting up projects Understanding Figma's design and collaboration features. Introduction to interface design principles. Layout and composition: grids, spacing, alignment, Typography and color theory for interface design	05 Hrs
II	Using frames to organize and structure designs, Creating shapes and vectors in Figma Editing shapes: resizing, rotating, flipping, Working with Components, Introduction to components and design systems, Creating and using reusable components, Master components and instance overrides	05 Hrs
II	Introduction to prototyping in Figma, Creating interactive prototypes: linking frames, adding transitions, Creating user flows and navigation patterns. Prototyping with overlays and interactions, Using smart animate for advanced animations. Creating responsive designs and adaptive layouts	05 Hrs

Text Books:

1.Designing Interface Animation: Improving the User Experience Through Animation by Val Head - This book covers principles and techniques for using animation in interface design, applicable to Figma.

2.The Elements of User Experience: User-Centered Design for the Web and Beyond by Jesse James Garrett - Although not specific to Figma, this book provides a comprehensive overview of user experience design principles that can be applied in Figma projects.

Referece Books:

1."Designing Interface Systems: Patterns for Effective Interaction Design" by Jenifer Tidwell - This book offers practical guidance on designing effective user interfaces, including patterns and best practices applicable to Figma.

VSC-2- Practical Based on VSC-1 (2)	
Total Credits : 01 Maximum Marks : 50	Total Contact Hours : 30 Hrs

List of practical to be conducted using Figma:

1	Creating account and setting up Figma
2	Create simple social media-style profile that makes use of autolayout and a few components
3	Using Components, how to rotate and align. Example, tangram puzzle model of seven pieces to learn about form and geometry
4	Using Layout Grids, Keyboard Shortcuts. Create a research paper
5	Auto Layout. Create custom components to have conversations and give visual feedback within collaborative documents
6.	Prototyping, Smart Animate
7.	Teaching layout concepts like baseline, columns, gutters, margins, and modules for widescreen presentations
8.	Minimum 3 more practical on the basis of syllabus to improve the practical knowledge of students.

This course will be available for the students from other faculty

GE/OE-2: Cyber Security

Total Credits: 02
Maximum Marks : 50

Total Contact Hours: 30 Hrs

Learning Objectives of the Course:

1. Make the student will understand Cyber Security, Data Privacy and Data Protection.
2. Students will acquainted with the Types of Security threats.
3. Make the student will understand Ethical Hacking, Email security: web authentication.

Course Outcomes (COs) :

After completion of the course, students will be able to –

1. Understands the concept and process of cyber security.
2. Understands the Online Dispute Resolution.
3. Knows the Network & Mobile Security Techniques

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Cyber Security: Meaning and Scope Computer & Cyber Security: Types of Attacks, Types of Security threats, Hacking Techniques	**15 Hrs**
II	Database Security; Operating System Security 2. Advance Computers, Network & Mobile Security Techniques 3. Security issues: debit cards, credit cards, ATM, Secure Electronic Transactions	**15 Hrs**

Reference Books:

1. Information Security and Cyber Laws, by Pankaj Sharma. S.K. Kataria & Sons
2. Fundamentals of Cyber Security, by Bhushan, Rathore, Jamshed, BPB
3. Cyber-security for Beginners, by Raef Meeuwisse. Cyber Simplicity Ltd
4. A Handbook of E-commerce, by Nidhi Dhawan, Sun India Publications
5. E-Commerce in India: Economic and Legal Perspectives, Pralok Gupta, Sage Publications India Pvt. Ltd.