

**SAKTHI COLLEGE OF ARTS AND SCIENCE FOR WOMEN, ODDANCHATRAM**

**(Recognized Under Section 2(f) and 12(B) of UGC Act 1956)**

**(Affiliated to Mother Teresa Women's University, Kodaikanal)**

**PG & RESEARCH DEPARTMENT OF COMPUTER SCIENE**

**CURRICULUM FRAMEWORK AND SYLLABUS FOR OUTCOME BASED EDUCATION IN**

**SYLLABUS FOR**

**M.SC., INFORMATION TECHNOLOGY**

**FRAMED BY**

**MOTHER TERESA WOMEN'S UNIVERSITY, KODAIKANAL**

**UNDER**

**CHOICE BASED CREDIT SYSTEM**

**2018-2021**

## **PREAMBLE:**

The Master of Science in Information Technology, (M.Sc., IT) is an intensive two year Post-graduate Programme, launched in Sakthi College of Arts and Science in the academic year 2010 – 2011. The Programme has been designed for students who wish to pursue a professional career in Information Technology. The courses are carefully designed by Mother Teresa Women's University, Kodaikanal, to guide the students through basic concepts to the current practices in industry. Hands-on Laboratory experience is emphasized at every stage of the Programme. With the intellect and the dedicated service of the faculty, the learners of this Programme are sure to attain a sound theoretical foundation, develop an ability to analyze, conceptualize and design systems and develop competency in modern software design and development tools. They can build a career as a software engineer, an analyst or a system designer.

## **VISION:**

- ✚ To produce qualified information technologists with highly sought-after skills and knowledge that apply to a wide range of private and public sector organisations' needs.

## **MISSION:**

- ✚ To impart skill based, career oriented and holistic development of the individuals through the best educational modules.

## **OBJECTIVES:**

- ✚ Preparing the graduates for the intellectual, analytical and practical challenges of a career in IT.
- ✚ Developing the knowledge and skills necessary to collate information, define, design and build or select the most appropriate IT solutions and developing a deeper understanding of how those solutions apply to professional contexts.
- ✚ Equipping the students with recent technologies in IT in order to make them compete in the corporate world.

## **Fixing the Learning Objectives:**

Since the Academic year 2018 – 2019, the learning objectives and outcomes of the programmes M.Sc., (IT) have been set, following the Bloom's Taxonomy Cognitive Domain. Accordingly, it is broken into six levels of learning objectives of each course. They are -

K1 / Knowledge = Remember

K2 / Comprehension = Understand

K3 / Application = Apply

K4 / Analysis = Analyze

K5 / Evaluation = Evaluate

K6 / Synthesis = Create

## Mapping COs with POs:

For each programme, the Educational objectives and the Specific objectives are specified. The programme outcomes are designed according to the curriculum, teaching, learning and evaluation process. For each course, the definite outcomes are set, giving challenge to the cognitive domain. The course outcomes are mapped with the programme outcomes. The performance of the stakeholders is assessed and the attainment rate is fixed, by using the measurements 'high', 'medium' and 'low'. The restructuring of the curriculum is done based on the rate of attainment.

## Institutional Objectives:

The institution has certain definite Institutional Objectives to be attained.

- Skill Development & Capacity Building
- Women Empowerment
- Self-reliance
- Gender Equity & Integrity

## Programme Educational Objectives:

The Programme M.Sc., (IT) is offered with certain Educational Objectives.

- To empower the students to critically analyze current trends and learn future issues from a system perspective at multiple levels of detail and abstraction.
- To acquire higher degree of technical skills in problem solving and application development.
- To promote the students with cumulative skill set to provide solutions to a given real world problems using current trend and technology.
- To exhibit continuous learning and research for the societal upliftment with human values and ethics.
- To enhance the students to present their wisdom on governmental as well as non-governmental services.

## Mapping PEOs with IOs:

Programme Educational Objectives (PEOs)	Institutional Objectives			
	1	2	3	4
<b>M.Sc., (Information Technology)</b>				
<b>PEO1:</b> To empower students to critically and analyze current trends and learn future issues from a system perspective at multiple levels of detail and abstraction.	*			
<b>PEO2:</b> To acquire higher degree of technical skills in problem solving and application development.		*		
<b>PEO3:</b> To promote the students with cumulative skill set to provide solutions to a given real world problems using current trend and technology.			*	

<b>PEO4:</b> To exhibit continuous learning and research for the societal upliftment with human values and ethics.				*
<b>PEO5:</b> To enhance the students to present their wisdom on governmental as well as non-governmental services.			*	

**Measuring: H – High; M – Medium; L – Low**

### **Programme Specific Objectives (PSOs):**

The Specific Outcomes of the M.Sc., (IT) Programme are -

**PSO1:** Gaining ability to work out effective and efficient real time solutions using acquired knowledge in Computer Science domain including theory, programming, algorithms, databases and web development.

**PSO2:** Pursuing lifelong learning and do research as computing experts and scientists to meet the requirement of corporate world and industry standard to provide solutions to industry, society and business.

**PSO3:** Acquiring professional skills in software design process and practical competence in board range of open source programming languages to withstand technological change and provide solutions to new ideas and innovations.

**PSO4:** Acquiring the knowledge of advanced programming skills and distributed environmental need for sustainable development.

**PSO5:** Pursuing careers in IT industry/consultancy/research and development, teaching and allied areas related to Information Technology.

## **M.SC., (INFORMATION TECHNOLOGY)**

### **Program Outcomes (POs):**

On successful completion of the M.Sc., (Information Technology) Programme, certain Outcomes are expected from the learners.

**PO1:** Developing creativity and problem solving skills with the knowledge of computing and mathematics.

**PO2:** Designing algorithms and develop software to aid solutions to industry and governments.

**PO3:** Reviewing the latest technology and tool handling mechanism.

**PO4:** Analyzing the outcome to solve global environment related issues.

**PO5:** Applying the knowledge in lifelong learning journey to equip themselves.

**PO6:** Becoming computer professionals and serving with ethical values.

**PO7:** Understanding the methods to communicate effectively and work collectively.

**COMMON ACADEMIC STRUCTURE / M.Sc., INFORMATION TECHNOLOGY / 2018 - 2021**

Sem	Sub. Code	Title of the Course	Hrs	Credits	Marks		
					CIA	CE	Total
<b>I</b>	PITT11	Part – III/Core – I/Programming in C & C++	6	5	25	75	100
	PITT12	Part–III/Core–II/Data Structures and Algorithms	6	5	25	75	100
	PITT13	Part–III/Core–III/Digital Principles & Computer Organization	6	5	25	75	100
	PITP11	Part–III/Core Practical – I/ C, C++ and Data Structures Lab	6	5	25	75	100
	PITE11	Part–III/Elective – I/Computer Graphics (or) Soft Computing	6	5	25	75	100
		<b>Total</b>		<b>30</b>	<b>25</b>		
<b>II</b>	PITT21	Part–III/Core – IV /Advanced Operating System	6	5	25	75	100
	PITT22	Part–III/Core – V /Java Programming	6	5	25	75	100
	PITT23	Part–III/Core – VI /Computer Networks	6	5	25	75	100
	PITP22	Part–III/Core Practical – II/ Programming in JAVA Lab	6	5	25	75	100
	PITE22	Part–III/Elective – II/Data Warehousing and Data Mining (or) Cryptography and Network Security	6	5	25	75	100
		<b>Total</b>		<b>30</b>	<b>25</b>		
<b>III</b>	PITT31	Part–III/Core–VII/ Relational Database Management System	6	5	25	75	100
	PITT32	Part–III/Core – VIII/Web Technology	6	5	25	75	100
	PITT33	Part–III/Core – IX/Software Engineering	6	5	25	75	100
	PITP33	Part–III/Core Practical – III / RDBMS Lab	6	5	25	75	100
	PITE33	Part–III/Elective – III/Software Project Management (or) Big Data Analytics	6	5	25	75	100
		<b>Total</b>		<b>30</b>	<b>25</b>		
<b>IV</b>	PITT41	Part–III/Core – X/Digital Image Processing	6	5	25	75	100
	PITT42	Part–III/Core – XI/Mobile Computing	6	5	25	75	100
	PITP44	Major Project	-	5	25	75	100
		<b>Total</b>		<b>12</b>	<b>15</b>		

**ASSESSMENT PATTERN**  
**CIA / QUESTION PATTERN & SCHEME**

<b>S.No</b>	<b>Section</b>	<b>Question Type</b>	<b>Marks Allotted</b>
1	Part - A	Six questions in multiple choice pattern, testing K1 and K2 are to be given. Each question carries one mark.	03X01 = 03
2	Part - B	Two descriptive questions, with alternate options, testing K3 and K4, are to be given. Each question carries four marks.	02X02 = 04
3	Part - C	Two descriptive questions, testing K5 and K6, are to be given. Three questions are to be answered. Each question carries 15 marks.	02X04 = 08
4		Assignment	05
5		Seminar	05
Total Marks in CIA			25

**CE / QUESTION PATTERN & SCHEME**

<b>S.No</b>	<b>Section</b>	<b>Question Type</b>	<b>Marks Allotted</b>
1	Part - A	Ten questions in multiple choice pattern, testing K1 and K2 are to be given. From each unit, two questions must be taken. Each question carries one mark.	10X1 = 10
2	Part - B	Five descriptive questions, with alternate options, testing K3 and K4, are to be given. Each question carries four marks. Questions are taken in the given order. Qtn. No. 11 (a) or (b) from Unit I Qtn. No.12 (a) or (b) from Unit II Qtn. No.13 (a) or (b) from Unit III Qtn. No.14 (a) or (b) from Unit IV Qtn. No.15 (a) or (b) from Unit V	5X4 = 20
3	Part - C	Six descriptive questions, testing K5 and K6, are to be given. Three questions are to be answered. Each question carries 15 marks. Questions are taken in the given order. Qtn. No. 16 from Unit I Qtn. No. 17 from Unit II Qtn. No. 18 from Unit III Qtn. No. 19 from Unit IV Qtn. No. 20 from Unit V	3X15 = 45
Total Marks in CE			75

**Programme:** M.Sc.,  
**Semester:** I  
**Course Type:** Part – III/ Core Paper – I  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Programming in C & C++  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Understanding the fundamentals of C programming.	Comprehension (Level 2)
Implementing different operations on arrays, functions, pointers, structures, union fields.	Application (Level 3)
Remembering the characteristics of Procedure and Object Oriented Programming Languages.	Knowledge (Level 1)
Becoming able to program using C++ features such as Operator Overloading, Virtual functions, Files, etc.	Application (Level 3)
Applying the concepts in object oriented programming in terms of software reuse and managing complexity to solve real-world problem.	Application (Level 3)

## COURSE CONTENT

### Unit I:

Fundamentals of C - Declarations-Variables – Data Types – Expressions – Relational and Logical operations – Control Statements – Conditional Statements – Arrays – Strings

### Unit II:

Pointers - Functions: user defined – Local and Global specification – Boolean Functions – Friend Functions – Standard input and output – Files.

### Unit III:

Principles of Object-Oriented Programming: What is C++? – Applications of C++ - C++ Statements – Structure of C++ Program, Tokens, Expressions and Control Structures – Functions in C++ - Classes and Objects.


### Unit IV:

Constructors and Destructors – Type Conversions – Inheritance: Extending Classes.

### Unit V:

Pointers, Virtual Functions and Polymorphism – Operator Overloading, Managing Console I/O Operations, Files

### Text Book

 E.Balagurusamy, “Programming in ANSI C” Tata McGraw Hill, 2002



## Reference Books

- ✚ Byron S.Gotfried, “Programming with C”, McGraw Hill Publication
- ✚ Herbert Schildt, “Teach Yourself C++”, III Edition, Tata McGraw Hill 5<sup>th</sup> Edition, 2000
- ✚ E.Balagurusamy, “Programming in ANSI C++” Tata McGraw Hill, 2002

**Programme:** M.Sc.,  
**Semester:** I  
**Course Type:** Part – III/ Core Paper – II  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Data Structures and Algorithms  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Remembering and understanding the fundamental data structures and implement them using programming languages.	Comprehension (Level 2)
Understanding and applying the time complexity of different problems.	Application (Level 3)
Understanding efficient data structures and applying them to solve the problem.	Application (Level 3)
Analyzing and evaluating the various algorithms.	Analysis/Evaluation (Level 4 / Level5)
Understanding and creating data structures and algorithms for various domains.	Creation (Level 6)

**COURSE CONTENT**

**UNIT I INTRODUCTION TO ANALYSIS OF ALGORITHMS**

Introduction to algorithms - Algorithm Analysis framework - Performance of algorithms: Space and Time Complexity - Asymptotic Notations: Big-Oh, Big-Omega and Big-Theta - Best, Worst and Average case analysis of algorithms. Mathematical analysis of Non recursive Algorithms - Sequential Search. Mathematical analysis of Recursive Algorithms - Recurrence relation - Binary search.

**UNIT II LINEAR DATA STRUCTURES**

Abstract Data Types (ADT) - List ADT - Array-based implementation - Linked list implementation - doubly-linked lists - Applications of Lists - Polynomial Operations. Stack ADT - Array based and linked List based implementation - Postfix expression evaluation. Queue ADT - Circular queue and linked List based implementation - Applications of Queues.

**UNIT III BINARY TREES AND PRIORITY QUEUES**

Trees - Binary trees - Binary tree representation and traversals - Threaded binary trees - Expression Trees - Binary Search Tree - Applications of trees. Balanced trees: AVL trees. Priority queue - Binary heap - Heap operations - Applications of heap.

**UNIT IV SETS AND HASHING**

Disjoint Set ADT - Dynamic equivalence problem - Set operations - Representation - Implementation of union - Find operations - Smart union algorithms - Path compression - Applications of set. Hashing - Closed hashing: Separate chaining - Open addressing: Linear and quadratic probing - rehashing - Extendible hashing.

## **UNIT V    GRAPHS**

Graph - Definitions - Representations - Topological sort - Breadth first traversal - Depth first traversal - Connected components - Shortest path algorithms: Single source shortest path - Minimum spanning tree - Prim's and Kruskal's algorithms.

### **Text Book(s):**

- ✚ Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, Fourth Edition, 2013.
- ✚ AnanyLevitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 2013.

### **Reference Book(s):**

- ✚ Ellis Horowitz and SartajSahni, "Fundamentals of Data Structures", Galgotia Book Sorce, Gurgaon, 2007.
- ✚ Jean-Paul Tremblay and Paul G. Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw-Hill, New Delhi, Second Edition, 1991.
- ✚ Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, New Delhi, 2006
- ✚ Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, "Introduction to Algorithms", Prentice Hall of India, New Delhi, Second Edition, 2007.

**Programme:** M.Sc.,  
**Semester:** I  
**Course Type:** Part – III/ Core Paper – III  
**Hours Required:** 6 Hrs / Week

**Subject:** Information Technology  
**Course:** Digital Principles and Computer Organization  
**Credits:** 5

**CIA:** 25

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Learning the basic structure of number system methods like binary, octal and hexadecimal understanding the arithmetic and logical operators	Knowledge (Level 1)
Defining the functions to simplify the boolean equations using logic gates.	Knowledge (Level 1)
Understanding various data transfer techniques in digital computer and control unit operations.	Comprehension (Level2)
Comparing the functions of the memory organization.	Analysis (Level 4)
Analyzing architectures and computational designs concepts related to architecture organization and addressing modes' Registers.	Analysis (Level 4)

## COURSE CONTENT

### Unit I:

Introduction to Computers – Number Systems – Data Types – Data Representations – Fixed Point, Floating Point, Gray, Excess – 3, Alphanumeric Codes – Binary Codes – Error Detection Codes  
Arithmetic Logic Unit: Binary Half Adder, Full Adder and Their Designs – Positive and Negative Numbers, Binary Addition & Subtraction Using 1s, 2s, 9s Complements, Binary Multiplication

### Unit II:

Digital Logic Circuits: Digital Computers – Logic Gates – Boolean Algebra –Map Simplification – Combinational Circuits – Flip Flops – Sequential Circuits

Digital Components: Integrated Circuits –Decoders – Multiplexers – Registers – Shift Registers – Binary Counters.

Memory Unit : Classification of Memory: Primary – Secondary – Cache Memory – Associate Memory – Virtual Memory – RAM, ROM

### Unit III:

Register Transfer Language – Register Transfer – Bus and Memory Transfer – Arithmetic Micro Operations – Logic Micro Operations – Shift Micro Operations – Arithmetic Logic Shift Unit.

Basic Computer Organization and Design: Instruction Codes – Computer Registers – Computer Instructions – Timing and Control Instruction Cycle – Memory Reference Instructions – Input – output

and interrupt complete computer description – Design of a Basic Computer – Design of Accumulator Logic.

**Unit IV:**

Arithmetic and Logic Units – Stack Organisation – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Microprocessor Organization – Addressing Sequencing – Micro Program Example.

**Unit V:**

Introduction to Parallel Processing – Parallelism in Uniprocessor System – Parallel Computer Structure.

**Text and Reference Books:**

- ✚ Digital Principles and Applications, Albert Paul Malvino, Donald P. Leach, McGraw Hill.
- ✚ Computer System Architecture, M. Morris Mano, Prentice Hall of India.
- ✚ Digital Computer Fundamentals, Thomas C. Bartee, McGraw Hill.
- ✚ Computer Organization, Hamachar V.C., Vranesic Z.G., Zaky S.G., Tata McGraw Hill.
- ✚ Computer Architecture and Organization, J.P. Hayes, McGraw Hill, Singapore.

**Programme:** M.Sc.,

**Subject:** Information Technology

**Semester:** I

**Course:** C, C++ and Data Structures Lab

**Course Type:** Part – III/ Core Practical – I

**Credits:** 5

**Hours Required:** 6 Hrs / Week

**CIA:** 25

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Demonstrating the concepts of pointers.	Application (Level 3)
Creating C program for linear data structure operations and its applications.	Creation (Level 6)
Creating programs using various sorting algorithms & searching methods.	Creation (Level 6)
Understanding the fundamentals of C++ programming structure, function overloading and constructors.	Analysis (Level 4)
Designing a program using C++ features such as Classes, Objects, Operator overloading, Inheritance, Polymorphism etc.	Application (Level 3)

## COURSE CONTENT

### C Programs

1. Swapping
2. Print floyd's triangle
3. Addition using pointers
4. Stack using array
5. Searching using structures
  - a. Linear search
  - b. Binary search
6. Sorting
  - a. Bubble sort
  - b. Insertion sort
  - c. Selection sort
7. Matrix
  - a. Add matrices
  - b. Subtract matrices
  - c. Transpose matrix
8. Merge two files

### C++ Programs

1. Classes and objects
2. Function overloading
3. Constructors
4. Friend function
5. Inline function

6. Operator overloading
7. Conversion function
8. Inheritance
9. Polymorphism
10. Files

**Programme:** M.Sc.,  
**Semester:** II  
**Course Type:** Part – III/ Core Paper – IV  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Advanced Operating System  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Understanding the design issues associated with operating systems.	Knowledge(Level 1)
Mastering various process management concepts including scheduling, deadlocks and distributed file systems.	Application (Level 3)
Preparing Real Time Task Scheduling.	Create (Level 6)
Analyzing Operating Systems for Handheld Systems.	Evaluate (Level 5)
Analyzing Operating Systems like LINUX and iOS	Create(Level 6)

## COURSE CONTENT

### UNIT – I OPERATING SYSTEMS OVERVIEW

Introduction to operating systems – Computer system organization, architecture – Operating system structure, operations – Process, memory, storage management – Protection and security – Distributed systems – Computing Environments – Open-source operating systems – OS services – User operating-system interface – System calls – Types – System programs – OS structure – OS generation – System Boot – Process concept, scheduling – Operations on processes – Cooperating processes – Inter-process communication – Examples – Multithreading models – Thread Libraries – Threading issues – OS examples.

### UNIT – II PROCESS MANAGEMENT

Basic concepts – Scheduling criteria – Scheduling algorithms – Thread scheduling – Multiple-processor scheduling – Operating system examples – Algorithm Evaluation – The critical-section problem – Peterson's solution – Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – Synchronization examples – Deadlocks – System model – Deadlock characterization – Methods for handling deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock detection – Recovery from deadlock.

### UNIT-III STORAGE MANAGEMENT



Memory Management – Swapping – Contiguous memory allocation – Paging – Segmentation – Example: The Intel Pentium - Virtual Memory: Background – Demand paging – Copy on write – Page replacement – Allocation of frames – Thrashing.

#### **UNIT –IV I/O SYSTEMS**

File concept – Access methods – Directory structure – File-system mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management – Protection.

#### **UNIT –V CASE STUDY**

The Linux System – History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Network Structure – Security – Windows 7 – History – Design Principles – System Components – Terminal Services and Fast User – File system – Networking.

#### **Text Book(s):**

- ✚ Abraham Silberschatz, Peter B. Galvin, Greg Gagne, —Operating System Concepts Essentials, John Wiley & Sons Inc., 2010.

#### **Reference Book(s):**

- ✚ Andrew S. Tanenbaum, —Modern Operating Systems, Second Edition, Addison Wesley, 2001.
- ✚ D M Dhamdhere, —Operating Systems: A Concept-based Approach, Second Edition, Tata McGraw-Hill Education, 2007.
- ✚ Charles Crowley, —Operating Systems: A Design-Oriented Approach, Tata McGraw Hill Education, 1996.
- ✚ William Stallings, —Operating Systems: Internals and Design Principles, Seventh Edition, Prentice Hall, 2011.

**Programme:** M.Sc.,  
**Semester:** II  
**Course Type:** Part – III/ Core Paper – V  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Java Programming  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>Description</b>	<b>Blooms' Taxonomy Level</b>
Understanding the concept of java programming.	Knowledge(Level 1)
Understanding JDBC and RMI concepts.	Application (Level 3)
Applying and analyzing java in Database.	Application/Analysis (Level 3/Level 4)
Handling different event in java using the delegation event model, event listener and class.	Evaluation (Level 5)
Designing interactive applications using java servlet, JSB and JDBC.	Creation(Level 6)

## **COURSE CONTENT**

### **Unit I**

Introduction: Introduction to java – Java and Internet – Byte codes – Features of Java – Java development Environment – Java character set – operators – control statements – simple programs.

### **Unit II**

Object Orientation in Java: Classes – Methods – Inheritance – Packages – Interfaces – programming examples.

Exception Handling: Fundamentals – Exception types – Try catch block – throw- throw clause – finally – user defined Exceptions.

### **Unit III**

Threads: Thread model – Thread priorities – Runnable interface – creating a thread- multiple threads – Synchronization – interthread communication – suspending-resuming and stopping threads.

### **Unit IV**

Input / Output: String handling – Exploring java io. Package.  
Applets: Applet basics – AWT classes – Window fundamentals – working with frame windows – graphics – AWT controls – Swing – Layout Managers – Menus – Event Handling.

### **Unit V**

Java Networking: Basics – Socket overview – TCP/IP client sockets- TCP/IP server sockets– URL – Datagram sockets.

Concepts of Advanced Java Programming: JAVA SCRIPTS – Servlets – JDBC – EJB – JSP.

### **Text Book**

- ✚ Patrick aught on- Herbert Scheldt- “JAVA2- The complete reference” Tata McGraw Hill Fifth Edition- New Delhi 2002

### **Reference Books**

- ✚ Deitel H M and Deitel P J “JAVA – How to Program “ Pearson Education - New Delhi 2003
- ✚ Hubbard John R- “Schaum’s Outline of Theory and Problems of Programming with Java” Tata McGraw Hill- Second Edition- New Delhi 2004
- ✚ Chitra A “Internet and Java Programming” ISTE 2002.

**Programme:** M.Sc.,  
**Semester:** II  
**Course Type:** Part – III/ Core Paper – VI  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Computer Networks  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>Description</b>	<b>Blooms' Taxonomy Level</b>
Understanding the data communication system, components and the purpose of layered architecture.	Knowledge(Level 1)
Becoming familiar with the functionality of each layer of OSI and TCP/IP reference model.	Comprehension (Level 2)
Building up a clear concern on the networking technologies.	Application (Level 3)
Working with internet structure.	Application(Level 3)
Understanding the Firewalls and can see how standard problems are solved and the use of cryptography and network security.	Comprehension (Level 2)

**COURSE CONTENT**

**UNIT – I INTRODUCTION, PHYSICAL LAYER**

Overview: Data Communication - Network Types - Internet History - TCP/IP Protocol Suite - The OSI Model - Digital Signals - Data rate limits - Performance - Line Coding - Block Coding - Transmission Media: Guided Media - Unguided Media – Switching.

**UNIT – II DATA LINK LAYER**

Link Layer Addressing - ARP - Error Detection and Correction - Data Link Control Services - Data Link Layer Protocols - HDLC - PPP - Media Access Control - Ethernet - Wireless LANs: IEEE 802.11, Bluetooth -Connecting Devices. .

**UNIT – III NETWORK LAYER**

Network layer Services - Packet switching - Performance - IPV4 addresses - Forwarding of packets - Internet Protocol - ICMPV4 - Mobile IP - Routing algorithms - Routing Protocols - IPV6 addressing - IPV6 protocol -Transition from IPV4 to IPV6

**UNIT – IV TRANSPORT LAYER**

Transport Layer Services - Protocols - UDP - TCP: Transition Diagram, Flow Control, Error Control, Congestion Control - SCTP - QoS: Flow Control to improve QoS - Integrated Services - Differentiated Services - Client Server Programming.

## UNIT – V      APPLICATION LAYER AND SECURITY

World Wide Web and HTTP - FTP - Electronic Mail - Telnet - Secure Shell - Domain Name System - Cryptographic Algorithms - Authentication Protocols - Message Integrity Protocols - Public Key Distribution(X.509) - Network Layer Security - Transport Layer Security - Application Layer Security - Firewalls.

### **Text Book(s):**

- ✚ Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill, Fifth Edition, 2013
- ✚ Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Morgan Kauffmann Publishers Inc., Third Edition, 2003.

### **Reference Book(s):**

- ✚ James F. Kuross, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet”, Addison Wesley, ThirdEdition,2004.
- ✚ Pete Loshin, “IPv6: Theory, Protocol and Practice”, ELSEVIER, Morgan Kauffmann Publishers Inc., Second edition, 2004
- ✚ William Stallings, “Data and Computer Communication”, Pearson Education, Sixth Edition, 2000.
- ✚ Andrew S. Tannenbaum, “Computer Networks”, Pearson Education, Fourth Edition, 2003
- ✚ D.E. Comer, “Internetworking with TCP/IP Vol- III”, (BSD Sockets Version), Pearson Education, Second Edition, 2003.
- ✚ W. Richard Stevens, “UNIX Network Programming Vol-I”, Pearson Education, Second Edition, 1998.

**Programme:** M.Sc.,  
**Semester:** II  
**Course Type:** Part – III/ Core Practical – II  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Programming in JAVA Lab  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>Description</b>	<b>Blooms' Taxonomy Level</b>
Understanding the implement concepts of java using HTML forms, JSP & JAR.	Knowledge (Level 1)
Becoming capable of implementing JDBC and RMI concepts.	Application (Level 3)
Developing the ability to write Applets with Event handling mechanism.	Analysis (Level 4)
Creating interactive web based application using Servlets and JSP.	Evaluation (Level 5)
Implementing Client Server Networking	Synthesis (Level – 6)

**COURSE CONTENT**

1. Demonstrate the Program structure of Java
2. Demonstrate the String Operations
3. Demonstrate Package Creation and use in Program
4. Demonstrate Inner Class
5. Demonstrate Inheritance
6. Demonstrate 2D Shapes on Frames
7. Demonstrate Text and Fonts
8. Demonstrate Event Handling for various types of Events
9. Multicasting Techniques
10. Swing Components
11. Demonstrate the use of Dialog Box
12. Create a Dialog Box
13. Create a Tool Bar- Menu & Popup Menu
14. Implement File Handlings
15. Demonstrate Applet Programming
16. Implement Generic Programming
17. Demonstrate JDBC on Applet/Application
18. Demonstrate Multithreading
19. Implement Client Server Networking

**Programme:** M.Sc.,

**Subject:** Information Technology

**Semester:** III

**Course:** Relational Database Management System

**Course Type:** Part – III/ Core Paper – VII

**Credits:** 5

**Hours Required:** 6 Hrs / Week

**CIA:** 25

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>Description of COs</b>	<b>Blooms' Taxonomy Level</b>
Understanding the basic concepts of Relational data Model, Entity- Relationship Model and Process of Normalization.	Knowledge (Level 1)
Understanding and constructing database using Structured Query Language (SQL) in Oracle9i environment.	Application (Level 3)
Learning basics of PL/SQL and develop programs using Cursors, Exceptions, Procedures and Functions.	Analysis (Level 4)
Understanding and using built-in functions and enhance the knowledge of handling multiple tables.	Application (Level 3)
Attaining a good practical skill of managing and retrieving of data using Data Manipulation Language(DML).	Analysis (Level 5)

## **COURSE CONTENT**

### **Unit I: Introduction**

Database Systems vs. File Systems- View of Data-Data Models-Database Languages- Transaction Management-Database System Structure-History of Database Systems-Database System Applications-Entity Relational Model.

### **Unit II: Relational Databases**

SQL-Basic Structure-Set Operations-Complex Queries-Joined Queries-DDL-Embedded SQL-Dynamic SQL-Other SQL Functions-Query by Example-Normalization.

### **Unit III:**

Relational Database Design-Indexing & Hashing-Static Hashing-Dynamic Hashing-Multiple Key Access-Integrity And Security.

### **Unit IV: Query Evaluation and Optimization**

Query Processing-Selection Operation-Sorting-Join Operation-Evaluation of Expressions-Query Optimization.

### **Unit V: Transaction Management**

Transaction Management-Concurrency Control-Protocols-Deadlock Handling-Recovery Systems-Recovery with Concurrent Transactions-Shadow Paging-Buffer Management-Case Studies-Oracle-Microsoft SQL Server

**TEXT BOOK**

1. Abraham Silberschatz, Henry F.Korth and S.Sudharssan, "Database System Concepts", 4<sup>th</sup> Edition, Tata McGraw Hill, 2002

**REFERENCE BOOKS**

2. Raghu Ramakrishnan & Johannesgerhrke, "Database Management Systems", McGraw Hill International edition, 2000
3. Introduction to RDBMS-C.J.Date



**Programme:** M.Sc.,

**Subject:** Information Technology

**Semester:** III

**Course:** Web Technology

**Course Type:** Part – III/ Core Paper – VIII

**Credits:** 5

**Hours Required:** 6 Hrs / Week

**CIA:** 25

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Understanding the concept of .NET frame work and scripting language	Comprehension
Choosing, understanding, and analyzing any suitable real time web applications.	Application (Level 3)
Integrating .NET languages to develop web applications.	Creation (Level 6)
Developing and deploying real time web application in web servers and in the cloud.	Creation (Level 6)
Extending this knowledge to .NET platform.	Application (Level 3)

## COURSE CONTENT

### UNIT-I

Introduction: Introduction to Internet- Web Client/Server Model- Protocols for Web Client/Server communication

### UNIT-II

Components of .NET Framework- Overview of IIS- ISAPI Extensions- ISAPI Filters.

### UNIT-III

Overview of .NET Framework: Web Forms- Common Language Runtime and Class Library- Managed Components- Web Services- COM+ Component services.

### UNIT-IV

Crash Course in VB.NET: Data Types- Arrays- Functions- Flow Control- Exception Handling- Constructors and Destructors- Class Properties- Inheritance

### UNIT-V

Polymorphism- Interfaces- Implementing polymorphism using Interfaces- Multithreaded Programming.

### Text Book

1. Visual Basic Programming 2005 Black Book- Steven Holzner et al- Dreamtech Press.

**Programme:** M.Sc.,

**Subject:** Information Technology

**Semester:** III

**Course:** RDBMS LAB

**Course Type:** Part – III/ Core Practical – III

**Credits:** 5

**Hours Required:** 6 Hrs / Week

**CIA:** 25

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>Description</b>	<b>Blooms' Taxonomy Level</b>
Understanding and appreciating and effectively explain the concepts of database technologies.	Remember(Level 1)
Designing and implementing a database schema for a given problem domain.	Application(Level 3)
Developing a query using SQL DML/DDDL	Analysis(Level 4)
Declaring and enforcing integrity constraints.	Knowledge (Level 1)
Designing PL/SQL such as Stored Procedures, functions, packages, cursors.	Create(Level 6)

## **COURSE CONTENT**

### **1. Creating Database**

Creating a Database

Creating a Table

Specifying Relational Data Types

Specifying Constraints

Creating Indexes

### **2. Table and Record Handling**

INSERT statement

Using SELECT and INSERT together

DELETE- UPDATE- TRUNCATE statements

DROP- ALTER statements

### **3. Retrieving Data from a Database**

The SELECT statement

Using the WHERE clause

Using Logical Operators in the WHERE clause

Using IN- BETWEEN- LIKE - ORDER BY- GROUP BY and HAVING

Clause

Using Aggregate Functions

Combining Tables Using JOINS

Subqueries

#### **4.Database Management**

Creating Views

Creating Column Aliases

Creating Database Users

Using GRANT and REVOKE

**Programme:** M.Sc.,

**Subject:** Information Technology

**Semester:** III

**Course:** Software Engineering

**Course Type:** Part – III/ Core Paper – VIII

**Credits:** 5

**Hours Required:** 6 Hrs / Week

**CIA:** 25

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>Description of COs</b>	<b>Blooms' Taxonomy Level</b>
Understanding the basic concepts of software engineering.	Remember(Level 1)
Applying the software engineering models in developing software application.	Application(Level 3)
Applying software engineering principles and approach used in industry.	Application (Level 3)
Applying the gained knowledge on how to do a software project with in-depth analysis.	Application (Level 3)
Inculcating knowledge on software engineering concepts in turn gives roadmap to design a new software project.	Analysis(Level 5)

## **COURSE CONTENT**

### **Unit I:**

Introduction to Software Engineering – Definition and Size Factors – Quality And Productivity Factors – Managerial Issues

### **Unit II:**

Planning as Software Project: Defining the Problem – Developing A Solution Strategy – Planning the Development Process – Planning An Organizational Structure – Other Planning Activities

### **Unit III:**

Software Cost Estimation: Software Cost Factors – Software Cost Estimation Techniques – Staffing Level estimation – Estimating Software Maintenance Costs

Software Requirements Definition: Software Requirements Specification – Formal Specification Techniques – Languages And Pre Processors For Requirement Specification

### **Unit IV:**

Software Design: Fundamental Design Concept – Module and Modularization Criteria – design Notations – Design Techniques – Detailed Design Considerations Real Time And Distributed System Design – Test Plans And Milestones, Walkthroughs And Inspections – Design Guidelines

### **Unit V:**

Verification and Validation: Quality Assurance – Walkthroughs And Inspections, Static Analysis – Symbolic Execution – Unit Testing And Debugging – System Testing – Formal Verification

Software Maintenance: Enhancing Maintainability During Development – Managerial Aspects of Software Maintenance – Configuration Management – Source Code Metrics – Other Maintenance Tools And Techniques

**TEXT BOOK**

1. Software Engineering Concepts – Richard Fairley

**REFERENCE BOOKS:**

2. Software Engineering Design – H.C Shooman

**Programme:** M.Sc.,

**Subject:** Information Technology

**Semester:** IV

**Course:** Digital Image Processing

**Course Type:** Part – III/ Core Paper – IX

**Credits:** 5

**Hours Required:** 6 Hrs / Week

**CIA:** 25

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>Description of COs</b>	<b>Blooms' Taxonomy Level</b>
Understanding the fundamentals of Digital Image Processing.	Remember(Level 1)
Understanding the mathematical foundations of digital image representation, image acquisition, image transformation, and image enhancements.	Application(Level 3)
Applying, Designing and Implementing and get solutions for digital image processing problems.	Application (Level 3)
Applying the concepts of filtering and segmentation for digital image retrieval.	Create (Level 6)
Exploring the concepts of Multi-resolution process and recognize the objects in an efficient manner.	Create (Level 6)

## **COURSE CONTENT**

### **UNIT –I FUNDAMENTALS OF IMAGE PROCESSING**

Introduction - Steps in image processing systems - Image acquisition - Sampling and Quantization - Pixel relationships - Color fundamentals and models - File Formats, Image operations: Arithmetic, Geometric and Morphological - Introduction to MATLAB - Image operations using MATLAB.

### **UNIT – II IMAGE ENHANCEMENT**

Spatial Domain - Gray level transformations - Histogram processing - Spatial filtering - Smoothing and sharpening - Frequency domain: Filtering in frequency domain - DFT, FFT, DCT - Smoothing and sharpening filters - Homomorphic filtering - Image enhancement using MATLAB.

### **UNIT – III IMAGE RESTORATION AND SEGMENTATION**

Noise models - Mean Filters - Order Statistics - Adaptive filters - Band reject Filters - Band pass Filters - Notch Filters - Optimum Notch Filtering - Inverse Filtering - Wiener filtering. Segmentation: Detection of discontinuities - Edge operators - Edge linking and boundary Detection - Thresholding - Region based segmentation - Morphological Watersheds - Motion segmentation.

#### **UNIT – IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS**

Multi Resolution analysis: Image pyramids - Multi resolution expansion - Wavelet transforms - Image compression: Fundamentals - Models - Elements of information theory - Error free compression - Lossy compression - JPEG standard, JPEG 2000, SPIHT, MPEG Standards. Image compression and enhancement using Wavelet transforms.

#### **UNIT – V IMAGE REPRESENTATION AND RECOGNITION**

Boundary representation - Chain Code - Polygonal approximation, signature, boundary segments - Boundary description - Shape number - Fourier Descriptor, moments- Regional Descriptors - Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching. Image Classification, retrieval. Image fusion - Digital compositing - Video motion analysis.

**Programme:** M.Sc.,  
**Semester:** IV  
**Course Type:** Part – III/ Core Paper – X  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Mobile Computing  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Understanding the need and requirements of mobile communication.	Remember(Level 1)
Focusing on mobile computing applications and techniques.	Application(Level 3)
Demonstrating satellite communication in mobile computing.	Anlysis (Level 4)
Analyzing about wireless local loop architecture.	Evaluation (Level 5)
Analyzing various mobile communication technologies.	Evaluation (Level 5)

**COURSE CONTENT**

**UNIT – I INTRODUCTION**

Introduction: Applications - A Simplified Reference Model. Wireless Transmission: Frequencies for radio transmission – Signals – Antennas - Signal Propagation – Multiplexing – Modulation – Spread Spectrum - Cellular System.

**UNIT – II MEDIUM ACCESS CONTROL**

Medium Access Control: Motivation for a Specialized MAC- Hidden and exposed terminals – Near and far terminals – SDMA – FDMA – TDMA - Fixed TDM – Classical Aloha – Slotted Aloha – Carrier Sense Multiple Access – Demand assigned Multiple Access – PRMA Packet Reservation Multiple Access – Reservation TDMA – Multiple Access with Collision Avoidance – Polling – Inhibit Sense Multiple Access. CDMA - Spread Aloha multiple access. Comparison of S/T/F/CDMA.

**UNIT – III TELECOMMUNICATION SYSTEMS**

Telecommunication Systems: GSM - Mobile Services – System Architecture – Radio Interface – Protocols - Localization and Calling – Handover – Security. UMTS and IMT 2000: UMTS releases and standardization - UMTS System Architecture - UMTS Radio Interface –UTRAN - UMTS Handover.

**UNIT – IV SATELLITE SYSTEM**



Satellite System: History – Applications – Basics - Routing– Localization – Handover.  
Wireless LAN: IEEE 802.11- System Architecture – Protocol Architecture - Physical Layer –  
Medium Access Control Layer. Bluetooth: User scenarios – Architecture – Radio Layer –  
Baseband Layer – Link Manager Protocol.

### **UNIT – V MOBILE NETWORK LAYER**

Mobile Network Layer: Mobile IP - Goals, Assumption, and Requirements – Entities and  
Terminology – IP Packet delivery – Agent discovery – Registration. Dynamic Host  
Configuration Protocol - Mobile Transport Layer: Traditional TCP - Congestion Control –  
Slow Start – Fast Retransmit.

#### **Text Book(s):**

1. Jochen Schiller, “Mobile Communications”, 2nd Edition, eighth impression, Pearson Education, 2011.

#### **Reference Book(s):**

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Thompson Learning, Second Edition, 2007.
2. William K Pratt, “Digital Image Processing”, John Willey, 2002.
3. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, PHI Learning Pvt. Ltd., First Edition, 2011.
4. Sanjit K. Mitra and Giovanni L. Sicuranza, “Non Linear Image Processing”, Elsevier, 2007.
5. S.Sridhar, “Digital Image Processing”, Oxford University Press, 2011.

**Programme:** M.Sc.,  
**Semester:** I  
**Course Type:** Part – III/ Elective Paper – I  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Computer Graphics  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Knowing and discussing hardware system architecture for computer graphics.	Remember(Level 1)
Understanding the current 3D graphics API.	Application(Level 3)
Becoming capable of discussing future trends in computer graphics	Application (Level 3)
Practicing and working out computer graphic concepts & APIs.	Synthesis (Level – 6)
Designing a model and rendering graphical data.	Creation (Level 6)

**COURSE CONTENT**

**UNIT I**

Overview of Graphics System – output primitives: points and lines – line drawing algorithm – circle generating algorithm – ellips generating algorithm – filled area primitives – character generation.

**UNIT II**

Two Dimensional transformation: basic transformation – Matrix representation – composite transformation and other transformation – window-to-viewport transformation, viewing – clipping – interactive input methods.

**UNIT III**

Three dimensional transformation: 3 D concepts – 3 D representation: polygon surfaces, curved line and surfaces, quadric surfaces – spline representation – cubic spline interpolation – Bezier curves – B Spline Curves and surfaces and Beta spline – fractal-geometric methods.

**UNIT IV**

Three dimensional geometric and modeling transformation – 3 D viewing – Visible surface detection methods – illumination models and surface-rendering methods.

**UNIT V**

Color Models and color applications: properties of light – standard primaries and the chromaticity diagram – all color models – conversion between HSV and RGB Models - Color

selection – Design and animation sequences – general computer animation functions – computer animation languages – Key frame system – Motion specification.

**REFERENCE BOOK**

Donald Hearn and M.Pauline Baker – Computer Graphics, Pearson Education, Second Edition.

**Programme:** M.Sc.,  
**Semester:** I  
**Course Type:** Part – III/ Elective Paper – I  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Soft Computing  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

S.No	Description	Blooms' Taxonomy Level
1	Understand soft computing techniques and their applications.	Knowledge (Level 1)
2	Comprehending the pattern classification in neural networks.	Comprehension (Level 3)
3	Analyzing various neural network architecture.	Analysis (Level 4)
4	Analyzing fuzzy relation and fuzzy logic & its applications.	Analysis (Level 4)
5	Applying and analyzing fuzzy logic in real time applications.	Creation (Level 6)

**COURSE CONTENT**

**UNIT – I NEURAL NETWORKS - I**

(Introduction and Architecture) Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks. Various Learning Techniques; Perception and Convergence Rule, Auto-Associative and Hetro-Associative Memory.

**UNIT – I NEURAL NETWORKS - II**

(Back Propagation Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perception Model; Back Propagation Learning Methods, Effect of Learning Rule Co-Efficient ;Back Propagation Algorithm, Factors Affecting Back Propagation Training, Applications.

**UNIT – I FUZZY LOGIC - I**

(Introduction) Basic Concepts of Fuzzy Logic, Fuzzy Sets and Crisp Sets, Fuzzy Set Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp Conversion.

**UNIT – I FUZZY LOGIC – II**

(Fuzzy Membership, Rules) Membership Functions, Interference in Fuzzy Logic, Fuzzy If-Then Rules, Fuzzy Implications and Fuzzy Algorithms, Fuzzifications and Defuzzificataions, Fuzzy Controller, Industrial Applications

**UNIT – V GENETIC ALGORITHM**

Basic Concepts, Working Principle, Procedures of GA, Flow Chart of GA, Genetic Representations, (Encoding) Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Applications.

**Text Book(s):**

1. S. Rajasekaran and G.A. VijayalakshmiPai, —Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, Prentice Hall of India, 2003.
2. N.P.Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press, 2005.
3. J.S.R. Jang, C.T. Sun and E. Mizutani, —Neuro-Fuzzy and Soft Computing, Pearson Education, 2004.

**Reference Book(s):**

1. Siman Haykin, —Neural Networks, Prentice Hall of India, 1999
2. Timothy J. Ross, —Fuzzy Logic with Engineering Applications, Third Edition, Wiley India, 2010
3. S.Y. Kung, —Digital Neural Network, Prentice Hall International, 1993.
4. Aliev. R.A and Aliev, R.R, — Soft Computing and its Application, World Scientific Publishing Company, 2001.
5. Wulfram Gerstner and WennerKristler, —Spiking Neural Networks, Cambridge University Press.
6. Bart Kosko, —Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligencel, Prentice Hall, 1992.

**Programme:** M.Sc.,

**Subject:** Information Technology

**Semester:** II

**Course:** Data Warehousing and Data Mining

**Course Type:** Part – III/ Elective Paper –I I

**Credits:** 5

**Hours Required:** 6 Hrs / Week

**CIA:** 25

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Understanding the basic data mining techniques and algorithms.	Comprehension (Level 2)
Comprehending the association rules, clustering techniques and data warehousing contents.	Comprehension (Level 2)
Comparing and evaluating different data mining techniques	Evaluation (Level 5)
Designing data warehouse with dimensional modeling and applying OLAP operations.	Application (Level 4)
Identifying appropriate data mining algorithms to solve real world problems.	Creation (Level 6)

**COURSE CONTENT**

**UNIT – I INTRODUCTION TO DATAWAREHOUSING**

Evolution of Decision Support Systems- Data Warehousing Components –Building a Data Warehouse, Data Warehouse and DBMS, Data Marts, Metadata, Multidimensional Data Model, OLAP vs. OLTP, OLAP Operations, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations.

**UNIT – II DATAWAREHOUSE PROCESS AND ARCHITECTURE**

Types of OLAP Servers, 3 –Tier Data Warehouse Architecture, Distributed and Virtual Data Warehouses. Data Warehouse Implementation, Tuning and Testing of Data Warehouse. Data Staging (ETL) Design and Development, Data Warehouse Visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview - Data Warehousing and Business Intelligence Trends - Business Applications - Tools – SAS.

**UNIT – III INTRODUCTION TO DATA MINING**

Data Mining - KDD versus Data Mining, Stages of the Data Mining Process- Task Primitives, Data Mining Techniques - Data Mining Knowledge Representation – Data Mining Query Languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data Cleaning, Data Transformation, Feature Selection, Dimensionality Reduction, Discretization and Generating Concept Hierarchies - Mining Frequent Patterns Association- Correlation.

## **UNIT – IV CLASSIFICATION AND CLUSTERING**

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Clustering techniques – Partitioning Methods - k-means- Hierarchical Methods - Distance-based Agglomerative and Divisible Clustering, Density-Based Methods – Expectation Maximization - Grid Based Methods – Model-Based Clustering Methods – Constraint – Based Cluster Analysis – Outlier Analysis.

## **UNIT – V TRENDS IN DATAMINING AND BIG DATA MINING**

Introduction to Big Data-Case Studies on Big Data Mining Tools: Apache Hadoop, Apache Mahout and R - Mining Complex Data Objects, Spatial Databases, Temporal Databases, Multimedia Databases, Time Series and Sequence Data; Text Mining – Web Mining- Application and Trends in Data Mining.

### **Text Book(s):**

- 1 Jiawei Han and MichelineKamber, —Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, Third Edition, 2011.
- 2 Paul Zikopoulos, Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, —Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming, McGraw-Hill Osborne Media, First Edition, 2011.

### **Reference Book(s):**

- 1 Mehmed Kantardzic, —Datamining Concepts, Models, Methods, and Algorithms, Wiley Interscience, 2003.
- 2 Alex Berson and Stephen J. Smith, —Data Warehousing, Data Mining and OLAP, Tata McGraw Hill Edition, Tenth Reprint 2007.
- 3 G. K. Gupta, —Introduction to Data Mining with Case Studies, Easter Economy Edition, Prentice Hall of India, 2006.
- 4 Gareth James, Daniela Witten, Trevor Hastie, RobertTibshirani, —An Introduction to Statistical Learning: with Applications in R, Springer, 2014.

**Programme:** M.Sc.,

**Semester:** II

**Course Type:** Part – III/ Elective Paper –I I

**Hours Required:** 6 Hrs / Week

**CIA:** 25

**Subject:** Information Technology

**Course:** Cryptography and Network Security

**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

S.No	Description of COs	Blooms' Taxonomy Level
1	Gaining knowledge of the process of cryptography algorithms.	Knowledge (Level 1)
2	Comparing and applying different encryption and decryption techniques to solve problems related to confidentiality and authentication.	Application (Level 3)
3	Applying and analyzing appropriate security techniques to solve network security problem.	Analysis (Level 4)
4	Exploring suitable cryptographic algorithms.	Evaluation (Level 5)
5	Working out different digital signature algorithms to achieve authentication and design secure applications.	Creation (Level 6)

**COURSE CONTENT**

**UNIT – I INTRODUCTION & NUMBER THEORY**

Services, Mechanisms and attacks-the OSI security architecture-Network security model- Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields- Polynomial Arithmetic –Prime numbers-Fermat's and Euler's theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.

**UNIT – II BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY**

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.

**UNIT – III HASH FUNCTIONS AND DIGITAL SIGNATURES**

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – El Gamal – Schnorr.



## **UNIT – IV SECURITY PRACTICE & SYSTEM SECURITY**

Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

## **UNIT V E-MAIL, IP & WEB SECURITY**

E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IP Security: Overview of IPSec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSL Attacks fixed in v3- Exportability-Encoding-Secure Electronic Transaction (SET).

### **Text Book(s):**

1. William Stallings, Cryptography and Network Security, 6 th Edition, Pearson Education, March 2013.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, “Network Security”, Prentice Hall of India, 2002.

### **Reference Book(s):**

1. Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata Mc Graw Hill, 2007.
2. Man Young Rhee, “Internet Security: Cryptographic Principles”, “Algorithms and Protocols”, Wiley Publications, 2003.
3. Charles Pfleeger, “Security in Computing”, 4th Edition, Prentice Hall of India, 2006.
4. Ulysess Black, “Internet Security Protocols”, Pearson Education Asia, 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, “Network Security, Second Edition, Private Communication in Public World”, PHI 2002.
6. Bruce Schneier and Neils Ferguson, “Practical Cryptography”, First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
7. Douglas R Simson “Cryptography – Theory and practice”, First Edition, CRC Press, 1995.

**Programme:** M.Sc.,

**Semester:** III

**Course Type:** Part – III/ Elective Paper –I I

**Hours Required:** 6 Hrs / Week

**CIA:** 25

**Subject:** Information Technology

**Course:** Software Project Management

**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Understanding the basic concepts of Software project management.	Remember(Level 1)
Identifying the different project contexts and suggesting an appropriate management strategy.	Application(Level 3)
Demonstrating through application, knowledge of the key project management skills.	Evaluation (Level 5)
Analyzing a comparison on product versus process quality management.	Analysis (Level 5)
Performing case studies on cost estimation models like COCOMO.	Create (Level 6)

**COURSE CONTENT**

**UNIT – I INTRODUCTION**

Project Definition – Contract Management – Activities covered by Software Project Management – Overview of Project Planning – Stepwise Project Planning - Project evaluation - Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation

**UNIT – II ACTIVITY PLANNING**

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control

**UNIT – III MONITORING AND CONTROL**

Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance

**UNIT – IV MANAGING PEOPLE AND ORGANIZING TEAMS**

Understanding Behavior – Organizational Behavior – Selecting The Right Person For The Job –

Instruction in the Best Methods – Motivation – The Oldham Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies

#### **UNIT – V DEVELOPMENT AND MANAGEMENT STANDARDS**

Microsoft solution Framework - PMBOK Guide - NASA practices - PRINCE 2 - Capability Maturity Model - Integration - open source tools for managing projects: Project information flow - basic infrastructure - collaborative document writing

#### **Text Book(s):**

1. Bob Hughes, Mike Cotterell, “Software Project Management”, Fifth Edition, Tata McGraw Hill, 2011
2. Adolfo Villafiorita, “Introduction to Software Project Management”, CRC Press 2014.

#### **Reference Book(s):**

1. Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, “Software Project Management”, Pearson Education, 1999
3. Jalote, “Software Project Management in Practice”, Pearson Education, 2002

**Programme:** M.Sc.,  
**Semester:** III  
**Course Type:** Part – III/ Elective Paper –I I  
**Hours Required:** 6 Hrs / Week  
**CIA:** 25

**Subject:** Information Technology  
**Course:** Big Data And Analytics  
**Credits:** 5

**CA:** 75

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

Description of COs	Blooms' Taxonomy Level
Comprehending the concept of Big data evaluation.	Comprehension (Level 2)
Acquiring knowledge of the concept of HDFS.	Knowledge (Level 1)
Installation of R and Hadoop.	Evaluation (Level 5)
Apply map reduce concepts to process big data.	Analysis (Level 5)
Design big data applications using hadoop components and R programming.	Create (Level 6)

**COURSE CONTENT**

**UNIT – I INTRODUCTION TO BIG DATA**

Introduction – understanding Big data-capturing bigdata-Volume-velocity-variety-veracity- Benefiting Big Data –Management of bigdata- organazing big data- Technology challenges

**UNIT – II BIGDATA SOURCES AND ARCHITECTURE**

Big data sources-people to people communication-m2m- big data applications- Examining big data types- structured data – unstructured data- semi structured data-integrating data type into big data environment-Big data Architecture.

**UNIT – II HADOOP**

Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization- Hadoop Architecture, Hadoop Storage. Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers-: HDFS- Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting and Aggregating, Map Reduce Scripts, Joins &Subqueries, HBase

**UNIT – IV ANALYTICS AND BIG DATA**

Basic analytics-Advanced analytics-operationalzed analytics-Monetizing analytics-modifying business intelligence products to handle big data- big data analytics solution-understanding text analytics-tools for big data.

**UNIT – V DATA VISUALIZATION & R**

Introduction-excellence in visualization- types of chart-Business Intelligence: Tools-skills-applications – Health care- Education-retail – E- Governance – Working with R- Import a data set in R- plotting a histogram-Big data mining

**Text Book(s):**

1. Anil Maheshwari, Data Analytics Made Accessible: 2017 edition Kindle Edition
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman “Big Data for Dummies “ Wiley India Pvt. Ltd. New Delhi, 2014

**Reference Book(s):**

1. Boris Iublinky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deRoos et al., “Understanding Big data ”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012. 6 IT2015 SRM(E&T)
4. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.
5. Jy Liebowitz, “Big Data and Business analytics”, CRC press, 2013.
6. Vignesh Prajapati, “Big Data Analytics with R and Hadoop”, Packet Publishing 2013.