Master of Science (Information Technology)

Two Year (Four Semesters) Course

The course of study of M.Sc. IT shall extend over a period of **four semesters** spread over two years. On satisfactory completion of the course and after passing the examinations, a candidate will be awarded the Master of Science (Information Technology) degree.

Every academic year shall be divided into two semesters. First semester starts from July and ends in December. Second semester starts from January and ends in June and so on. There shall be an examination at the end of each semester. The examinations shall consist of theory papers, practical papers.
Medium of instructions and examination will be **English** only.

Eligibility for Admission:
The admission of the students for M.Sc(IT) I and III Semester will be taken for July to December session and II and IV Semester will be from January to June session.
A candidate who has qualified graduate degree with at least 50% marks (48% for SC/ST/OBC/SOBC category) of Rajasthan University or any other university recognized as equivalent shall be admitted to the first year of M.Sc. (Information Technology) Course .

Semester	Course Duration	Examination Time
I , III	July to December	December
II, IV	January to June	June

Examination Scheme:
Each theory paper shall be of 100 marks (70 marks for written examination of 3 hrs duration and 30 marks for internal assessment).
Each practical paper shall be of 100 marks (60 for practical exam and 40 for internal assessment).
The basis for internal evaluation in theory shall be home assignment, internal test and regularities in the attendance.
The basis for internal assessment in the laboratory courses shall be timely submission of the lab. records, performance in the lab., internal tests etc.

Each theory paper examination will be of three-hour duration and shall carry 70 marks. Theory paper shall contain three parts.
a) Part-A will contain 12 very short questions of 1 mark each (student will attempt any 10).
b) Part B will contain 4 short descriptive types of questions each carrying 5 marks, all are compulsory.
c) Part C will contain 4 long descriptive types of questions each carrying 10 marks, all questions are compulsory with internal choice.

Each practical examination (Maximum marks 100) will be of four- hour duration on one day and carry 60 marks for exercise(s) assigned in the examination and Viva , and 40 marks for the Internal Assessment.

S.No.	Question Pattern	Max. Marks (Theory)		Max. Marks (Practical)	
		ESE	CIA	ESE	CIA
1	Part A: 12 Very Short Questions (attempt any 10)	10 X 1=10			
2	Part B: 4 Short Question from all Units (Compulsory)	4 X 5 =20			
3	Part C: 4 Questions from each Unit with Internal Choice	4 X 10=40			
	Sub Total	**70**	**30**	**60**	**40**
		100		**100**	

Attendance:

A candidate shall be required to put in a minimum of 75% attendance at the lectures and 75% attendance at the practical's separately in each paper.

Examination Scheme:

Sr. No.	Paper	ESE	CIA	Total
1	Theory	70%	30%	100
2	Practical	60%	40%	100

Number of Units in Syllabus:

Sr. No.	Stream	No. of Units
1	M.Sc.(IT)	4

Maximum Marks for the Course and Number of Units of Each subject 2 Years / 4 Semesters:

Sr. No	Stream	Semester	Number of Papers per semester		Total Marks (Credits) of 1 Semester	Sub Total	Grand Total
			Theory (Credits)	Practical (Credits)			
1	M. Sc. (IT)						
		I ,II, III Sem	5 X 100 (5 X 4)	3 X 100 (3 X 4)	500 +300 = 800 (20 + 12 = 32)	800 X 3 = 2400 (32 X 3 = 96)	2400 (96)
		IV Sem, Project	2 X 100 (2 X 4)	1 X 200 (1 X 8)	300+300 = 600 (8 +8 =16)	600 X 1 =600 (16)	600 (16)
							3000 (112)

Programme Outcomes

PO1: The program equips students with essential domains of computer science and Information Technology (IT). It empowers them to apply core concepts in the development of domain-specific applications.

PO2: The program fosters critical thinking, cultivates problem-solving skills, encourages evaluative learning of various techniques, and deepens comprehension of problem essence.

PO3: The program educates students about the latest industry technologies. The continuous review of syllabi adds value to graduates, preparing them to address dynamic industry demands.

PO4: The program instructs students in applying advanced tools to address real-world challenges.

PO5: The program trains students in designing and conceptualizing software architecture, managing complex product development processes, and making informed decisions for project management selection.

PO6: Real-world projects expose students to challenging industry environments, making them employable and industry-ready through hands-on project development training.

PO7: The program hones students' teamwork skills and nurtures their ability to lead project management teams

Semester Structure:

M.Sc. Information Technology Semester I

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	PMIT101	Programming Fundamentals	DSC	4	4			3	
2.	PMIT102	Database Management System	DSC	4	4			3	
3.	PMIT103	Fundamentals of Information Technology	DSC	4	4			3	
4.	PMIT104	Computer Architecture	DSC	4	4			3	
5.	PMIT105	Operating System	DSC	4	4			3	
6.	PMIT151	'C' Programming Lab	DSCP	4			6		2
7.	PMIT152	DBMS Lab	DSCP	4			6		2
8.	PMIT153	Office Management Lab	DSCP	4			6		2

M.Sc. Information Technology Semester II

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	PMIT201	Object Oriented Programming Concepts using java Programming	DSC	4	4			3	
2.	PMIT202	Data Structure and Algorithms	DSC	4	4			3	
3.	PMIT203	Web Designing and development	DSC	4	4			3	
4.	PMIT204	Management Information System	DSC	4	4			3	
5.	PMIT205	Data Communication and Networking	DSC	4	4			3	
6.	PMIT251	Java Programming Lab	DSCP	4			6		2
7.	PMIT252	Data Structure Lab	DSCP	4			6		2
8.	PMIT253	Web Designing Lab	DSCP	4			6		2

M.Sc. Information Technology Semester III

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	PMIT301	.Net Technologies	DSC	4	4			3	
2.	PMIT302	Python Programming	DSC	4	4			3	
3.	PMIT303	PHP	DSC	4	4			3	
4.	PMIT304	E-Commerce Application Development	DSC	4	4			3	
5.	PMIT305	Software Engineering and Testing	DSC	4	4			3	
6.	PMIT351	.Net Lab	DSCP	4			6		2
7.	PMIT352	Python Lab	DSCP	4			6		2
8.	PMIT353	PHP Lab	DSCP	4			6		2

M.Sc. Information Technology Semester IV

S.No.	Subject Code	Course Title	Course Category	Credit	Contact Per Week			EoSE Duration (Hrs.)	
					L	T	P	Thy	P
1.	PMIT401	**Elective Paper-I** Artificial Intelligence and Expert Systems Information Protection and Security Research Methodology Swayam MooC IT related course*	DSC	4	4			3	
2.	PMIT402	**Elective Paper-II** Open Source Operating System Cloud Computing Mobile Application Development Swayam MooC IT related course*	DSC	4	4			3	
3.	PMIT451	Project(Project, Report, Viva) (12 Weeks)	DSCP	8					2

M.Sc. – IT First Semester

PMIT101: Programming Fundamentals

Course Outcomes:
CO1: Understand the concept of Algorithms and different symbols used in flowcharts
CO2: Develop conditional and iterative statements to write C programs.
CO3: Utilize user-defined functions to solve real-time problems.
CO4: Create C programs that utilize pointers to access arrays, strings, and functions.
CO5: Apply user-defined data types, including structures and unions, to solve problems.
CO6: Demonstrate the concept of file handling to showcase input and output operations in C
programs.

Unit-I
Problem Solving with Computers: Algorithms, and Flowcharts.
Basic Structure of C Programs: Creating, Compiling, Linking and Execution of a C program
Header Files, C Tokens (Keywords, Identifiers, Constants, and Special symbols), Data types, and
Variable declaration, Operators, Expressions, Managing Data Input and Output Operations.
Decision Making and Branching, Looping and Jumping Statements.

Unit-II
Arrays: Declaration, Definition, One and Two Dimensional Arrays, Character Arrays and
Strings.
Functions: Definition, Need for Functions, Standard and User-Defined Functions, Function Calls,
Category of Functions, Recursion, Storage Class Specifiers

Unit-III
Structures and Unions: Array of Structures, Nesting of Structures.
Pointers: Declaration, Definition and Use of Pointers, Difference between Pointers and
Structures.

Unit-IV
File Management in C: Creating, Opening and Closing a File, I/O Operations on Files,
Command Line Arguments. Dynamic Memory Allocation, Pre-Processor.

Recommended Books:
1. Kerighan & Richie the C programming language (PHI Publication)
2. Byron Gottorfried Schaum's outline of programming with C
3. E.Balaguruswamy Programming in Ansi 'C' (Tata McGraw Hill)
4. Kanetkar "Let Us C", BPB Publications. (Tata McGraw Hill)

PMIT102: Database Management System

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Introduction to Database Concepts: Database and Need for DBMS ,Characteristics of DBMS, Database Users, 3-tier architecture,(its advantages over 2- tier) Data Models, Views of data-schemes and instances, Independence, Data modeling using the Entity-Relationship approach, Entities, Relationships, Representation of entities, attributes, relationship set, Generalization , Aggregation.

Unit-II
Relational model: Overview of database models, Relational Model, Structure of relational database, different types of keys, Expressing M: N relation, relational algebra, Constraints.
Relational Database Design: Functional dependencies, Normalization Normal forms based on primary keys (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5 NF) Lossless joins and dependency preserving decomposition.

Unit-III
SQL: Introduction to SQL, SQL Data types and Literals, Types of SQL commands, SQL Operators and their procedures, Tables, Views and Indexes, queries and sub-queries, aggregate function, insert, delete and update operations, Joins, Unions, Intersections, Minus in SQL.
Query Processing: Query Processing Stages, Estimation of Query Processing Cost, Introduction to Transactions, States of Transactions, ACID Properties

Unit-IV
Concurrency Control: Concurrency Control, Lock Based Protocols, Two Phase Locking protocol, Timestamp-based Protocol, multiple granularity, Deadlock Handling, Deadlock Prevention, Deadlock Detection and Recovery.
Recovery: Failure classification, recovery concepts, database backup, recovery concepts based on deferred update and on immediate update. Shadow paging, check points, an overview of Distributed database and client-server Database

Recommended Books:
1. Fundamental of Database Systems by R. Elmasri, S. Navate; Benjamin Cummings
2. Introduction to database systems by C. J .Date
3. Database system concept by Korth
4. Principles of Database Management by James Martin
5. Relational database design for Micro computers Application by Prentice Hall (Jackson)
6. Database Management Systems by Bipin Desai

PMIT103: Office Management Tools (For Session 2013-14 only)

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

                                                         Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Word Processing Software : Creating and Saving documents, Entering, Editing, Moving, Copying and Formatting Text, Page formatting, Finding and replacing text, Spell checking and Grammar checking, Indexing, Columns, Tables and feature there in, Inserting (Objects, picture, files etc.), Using Graphics, templates and wizard, using mail merge, using WordArt, customizing, MS Word. Editing Fills and recoloring pictures.

Unit-II
Spreadsheet Software : Spreadsheet terminology, organization of the worksheet area, entering information, editing cells using commands and functions, moving copying, inserting and deleting rows and columns, formatting worksheet, printing worksheet, creating charts, modifying charts, using date, time and addressing modes, macro.

Unit-III
Presentation Software : Anatomy of a PowerPoint Presentation, Creating and Viewing a presentation, Managing Slide Shows, Navigating through a presentation, Using hyperlinks, adding graphics, multimedia and special effects.

Unit-IV
Data Base Management Software : Planning a database (tables, queries, forms, reports), Creating and editing database, customizing tables, linking tables, designing and using forms, modifying database structure, maintaining database, Sorting and Indexing database, Querying a database and generating Reports, modifying a Report, exporting a report to another format.

Recommended Books:
1. Microsoft; 2007 Microsoft Office System; PHI
2. Microsoft; Microsoft Office 2003: Plain & Simple; PHI
3. Microsoft; Microsoft Office XP: Plain & Simple; PHI
4. Sanjay Saxena; A First Course in Computers 2003 Edition; Vikas Pub.

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Number Systems: natural numbers, integers, rational numbers, real numbers, complex numbers, arithmetic modulo a positive integer (binary, octal, decimal and hexadecimal number systems), floating point notation.
Binary Arithmetic: 2's complement arithmetic, conversion of numbers form one of binary/ octal/ decimal /hexadecimal number system to other number systems, Codes (Natural BCD, Excess-3, Gray, Octal, Hexadecimal, Alphanumeric- EBCDIC and ASCII), Excess-3, Gray, Octal, Hexadecimal, Alphanumeric- EBCDIC AND ASCII), Error Codes.

Unit-II
Logic and Proofs: Proposition, Conjunction, Disjunction, Negation, Compound proposition, Conditional propositions (Hypothesis, conclusion, necessary and sufficient condition) and Logical equivalence, De Morgan's law, quantifiers, universally quantified statement, generalized De Morgan's Laws for Logic, component of Mathematical system (axiom, definitions, undefined terms, theorem, lemma and corollary), proofs (direct proofs, indirect proofs, proof by contra-positive), valid argument, deductive reasoning, modus ponens (rules of inference), universal instantiation, universal generalization, existential instantiation, universal generalization resolution, principle of mathematical induction, structural induction.

Unit-III
Sets, Venn diagrams: ordered pairs, sequences and strings, relation (reflexive, symmetric, anti-symmetric, transitive, partial order), inverse relation and composition of relations, relational database, functions (injective, surjective, bijective), composition of functions, equivalence relations interpretation using digraphs, cardinals.

Unit-IV
Graph: Graph theory undirected graph, digraph, weighted graph, similarity graphs, paths and cycles, Hamiltonian cycles, shortest path algorithm. Isomorphism of graphs, planar graphs.
Trees: characterization of trees, spanning trees, breadth first search and death first search method, minimal spanning trees, binary trees, traversals.

Recommended books:
1. C.l.Liu elements of Discrete Mathematics Tata McGraw Hill publishing Company Ltd., 2000
2. Richard johnsonbaugh discrete mathematics Pearson Asia 2001 .
3. John Truss: Discrete Mathematics for Computer Scientists, Pearson Education, Asia, 2001.
4. Robert J.McEliece : Introduction to Discrete Mathematics, Tata Mc. Graw Hill, India.
5. Lipschutz : Discrete Mathematics, Tata Mc. Graw Hill India.
6. Kenneth H. Rosen, Discrete mathematics and Applications, Tata Mc. Graw Hill, India.

PMIT103: Fundamentals of Information Technology (From Session 2022-23 onwards)

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT- I

Information Technology: Defining IT, Data and Information, Elements of Electronic data processing system, Transaction processing, Modes of transactions, IT Applications.

Introduction to Computers: Generation of computers, classification of computers. Input and Output Devices: Keyboard, pointing devices, speech recognition, digital camera, scanners, optical scanners, printers, plotters, computer output microfilm (COM), monitors, audio output, projectors, and terminals.

UNIT- II

Computer System: Central processing unit (CPU), memory, instruction format, instruction set. Primary and Secondary Memory: Memory hierarchy, random access memory (RAM), types of RAM, read only memory (ROM), types of ROM. Classification of secondary storage devices, magnetic tape, magnetic disk, optical disk. Number Systems: Number systems, conversion between number bases.

UNIT- III

Computer Program: Introduction, developing a program, algorithm, flowchart, pseudo code. Computer Languages: Introduction, classification of programming languages, generations of Programming languages features of a good programming language.

Computer Software: Software definition, relationship between software and hardware, software categories, system software, application software.

UNIT-IV

Internet Basics: Introduction, evolution of Internet, basic Internet terms, getting connected to Internet, Internet applications, electronic mail, Web Browsers, searching the web (search engines), Internet Service Providers.

Security issues in Internet: Bugs, Viruses, Anti-viruses, Firewalls, Internet threats to the society, Cyber laws and Legal issues.

Reference Books:
1. Introduction to computer Science, ITL Education solution Limited, R & amp; D Wing, PEARSON Education.
2. Rajaraman V. – Fundamental of Computers, Prentice Hall of India Pvt. Ltd., New Delhi.
3. Computer Fundamentals by P.K. Sinha; BPB Publication, New Delhi 8.
4. Peter Norton's Introduction to Computers, Third Edition, McGraw Hill

PMIT104: Computer Architecture

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit -I
Introduction to Digital Computer: Overview of the Digital Computer System (Processor, Memory, Input and Output Devices, Storage Devices, Representation of Data: Digital versus Analog, Digital number system (binary, octal, decimal and hexadecimal numbers,) conversion from one form to another, fractional numbers and signed numbers, 1'S, 2'S Complements, Fixed point and floating point representations, Boolean algebra (addition, subtraction, multiplication and division), Logic Gates (NOT, OR, AND, NAND, NOR, XOR, XNOR) types Codes (ASCII, EBCDIC, Unicode) Combinational Circuits(Multiplexer, Demultiplexer, coder, Encoder)Sequential Circuits(Flip flops, registers, Counters).

Unit-II
Anatomy of a Computer: Mother Board (Special reference to Intel 810 Chipset motherboard), CISC Micro Processors (Special reference to Pentium, AMD, Cyrix), RISC, types of RAM, Flash, Cache, types of memory modules (SIMM, DIMM), System clock, Bus (Data, Address, Control), Expansion slots (ISA, MCA, EISA, PCI, AGP).

Unit-III
I\O and Storage Devices: Input devices, Output devices, Printers (Dot-Matrix, Line, Label, Ink-Jet, Laser, Color Laser, thermal wax, dye sublimation, fiely, IRIS), Plotters (Pen, Ink-jet, electrostatic), Voice output], Storage devices I Storage types (Magnetic, Optical, Magneto-optical, Solid state), random versus sequential access, formatting, tracks and sectors, speed, storage capacity, Floppy Disk (5.25 inch, 3.5 inch; 2HD, zip, Superdisk, HiFD) Hard Disk (tracks, cylinders, sectors; Hard Drive Interfaces (IDE, EIDE, Fast SCSI, Fast/wide SCSI, Uitra SCSI; Hard Disk Cartridges, RAID), Optical Disks [pits and lands, CD-ROM, R, RW, DVD-ROM, R, RAM)], Magnetic tape (reels, streamers, DAT,DLT, stripe, Smart card), Modem (Fax/Data/Voice).

Unit-IV
Computer Memory Systems: Architecture of Digital Computer, Processor Design Principles, Control Unit Design: Conventional and Micro programmed, Input- Output System. Memory and I/O Organization: Interfacing with CPU; Main Memory, Auxiliary Memory, Cache Memories, Associative Memory and Virtual Memory. I/O Interfacing with CPU, Addressing Data Transfer Techniques.

Recommended Books:
1. Computer Architecture And Organization: Mcgraw Hill, 2nd Edition, John Hyaes.
2. Computer System Architecture: PHI, 3rd Edition, M.Morries Mano.
3. Computer Organization And Design: Prentice Hall Of India, Chaudhari P.P.
4. Perspective In Computer Architecture: Prentice Hall Of India, Rao P.V.S.
5. Computer System Architecture: Prentice Hall, Tannenbaum A.

6. Parallel Computer Architecture: A Hardware/Software Approach by David Culler

PMIT105: Operating System

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Introduction to Operating System: Types of software (System/Application), Translators (Assemblers/ Interpreters/ Compilers), Operating system as a resource manager, Operating system need and services, Classification and Evolution of OS, Hierarchical/Layered Organization of OS.

Unit-II
Process Management: Process concept, Process Control Block, Process Life cycle, Type of Scheduler, Scheduling criteria, multiple processor scheduling, scheduling Algorithm, FCFS, SJF, Priority and round robin scheduling, critical section, semaphores. Asynchronous parallel process, multithreading at system/user level, Inter process communication, Process Synchronization & Deadlock, Monitors, Deadlock prevention & avoidance, Deadlock Detection and deadlock Recovery.

Unit-III
Memory Management: Memory Management Techniques; Single partition allocation, multiple partition allocation, Swapping, paging and segmentation, segmented-paged memory management techniques; logical and physical address space; address mapping. Demand paging, Virtual memory, protection and address mapping hardware, page fault, Page replacement and page removal algorithms.

Unit-IV
Device Management and I/O Programming: Disk structure, disk scheduling, access method and storage capacity; sharable and non sharable devices and their management.
Information Management & File System: File organization and access methods, logical and physical file structure; physical file system realized with device management function; file allocation methods, linked and index allocation, logical file implemented on physical file system. File protection and security, Directory structure, single level, two level, tree structure, Free Space Management, Allocation Methods.

Recommended Books:
1. James L. Peterson & A. Silberschatz: Operating System Concepts; 2nd Edn., Addison Wesley, World Student Edition
2. Andrew S. Tenenbaum : Modern Operating Systems; Prentice Hall, India
3. Dietel H.M.: An Introduction To Operating Systems; Addison Wesley, World Student Edition
4. Systems Programming & Operating Systems, 2nd Edn., Tata Mc Graw Hill

PMIT151: 'C' Programming Lab
Examination: Practical
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PMIT152: DBMS Lab
Examination: Practical
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PMIT153: Office Management Lab
Examination: Practical
Exercises to be framed so as to cover the topics and tools covered in theory paper.

M.Sc. – IT Second Semester

PMIT201: Object Oriented Programming Concepts using Java Programming

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Introduction: Object Oriented Concepts, Introduction to Java, Features of Java, Java virtual machine.
Programming Fundamentals of Java: Java Tokens, Operators, Data types, Control Structures, Array

Unit-II
Classes and Objects: Object References, Method Overloading, Constructors, Constructor Overloading, Inheritance. Static, Final, Abstract Keywords
Packages and Interfaces: Access Specifiers, Package Creation, Use of packages, Basics of Interfaces, Use of Interfaces
String Handling: String Class, String methods.

Unit-III
Exception handling in Java: Exception classes, Exception raising & handling, use of Try, Catch and finally, Throwing Exceptions, User Defined Exceptions.
Applets: Introduction to Applets, Applet life cycle, Creating Applets, Applet Viewer
Graphics: Graphics Components, Color, Font, Drawing Objects

Unit-IV
Threading in Java: Concepts of Multi-threading, Thread Life Cycle, Thread class, Runnable Interface, Thread Management in Java
JDBC: JDBC Drivers, Two Tier and Three Tier client server Architecture, Setting up a connection to database, Creating and executing SQL statements

Reference Books:
1. C. Thomas Wu, An Introduction to OOP with Java, Mc Graw Hill.
2. Deitel and Deitel, Java, How to Program, Pearson Education Asia.
3. E. Balaguruswmy, Programming with Java, Tata McGraw Hill.
4. Zukowski: Mastering Java 2, BPB Publications.
5. Herbert Scliildt, Java 2, Tata Mc Graw Hill.

PMIT202: Data Structure and Algorithms

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks:40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I

Introduction, Types of Data Structures, Algorithm, Pseudocode, Characteristics of Algorithms, Algorithm Analysis, Algorithm Complexity – Space Complexity, Time Complexity, Abstract Data Types.
String Processing – Basic Terminology, Storing Strings, String Operations, Pattern Matching Algorithms.
Arrays: Representation in Memory, Operations - Insertion, Deletion, Searching – Linear Search, Binary Search, Sorting – Bubble Sort, Multidimensional Arrays, Pointers, Pointer Arrays.

Unit-II

Sorting: Internal and External Sorting Techniques, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Radix Sort.
Linked lists: Linked List Vs. Arrays, Representation in Memory, Types of linked List - Singly Linked list, Doubly Linked list, Circular Linked list, Doubly Circular Linked list., Operations on Singly Link List – Insertion, Deletion, Traverse, Searching.

Unit-III

Stacks: Array and Linked List representation of Stacks, Operations – Insertion, Deletion, Traverse, Application of Stack – Recursion, Polish Notation.
Queues: Array and linked list representation in Memory, Type of Queues – Simple Queue, Circular Queue, Priority Queue, Double Ended Queue. Operations on Simple and Circular Queue – Insertion, Deletion, Traverse. Applications of Queues.

Unit-IV

Trees: Basic Tree Concepts, Representation of Binary Tree in memory, Binary Tree Traversals, Binary Search Trees, Heapsort.
Graphs: Representations, sequential representation, Warshall's Algorithm, Linked Representation of graphs, Operations on Graph, Traversing Graph.

Reference Books:

1. S. Lioschutz: Data Structures, Mc Graw Hill International Edition.
2. A.V. Aho., J.E. Hopcroft, and J.D. Ullman, Data Structures and Algorithms, Pearson Education Asia.
3. A. Michael Berman: Data Structures via C++, Oxford University Press.
4. Sara Baase and Allen Van Gelder: Computer Algorithms, Pearson Education Asia.
5. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data structures with applications, TMH Publishing Co. Ltd.

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PMIT203: Web Designing and Development

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
The Internet: History of the World Wide Web, Hardware and Software Trend, Web Server, Web Client.
Creating Web Pages: Introduction to HTML, Types of tags, Formatting Tags, Common Tags, Hyperlinking, Images, Image Maps, Marquee Tag, Horizontal Rules, Lists.

Unit-II
Advance Concepts of HTML: HTML Tables, HTML Forms, Frames
Dynamic HTML: CSS : introduction, inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the box model, user style sheets, Filters and Transitions.

Unit-III
Java Script: Introduction to scripting language, Client side versus Server side scripting , Advantages of Java Script, Features of Java Script, Keywords, Variables, Data Types, Constants, Comments, Java script control structures, Arrays, Array Library Methods, Java script Methods

Unit-IV
DOM: Introduction, Window, History, Navigator, Form, Frames, Location Objects.
Event Handling in Java Script: Different types of events, key events, mouse events, loading events, Event Handlers,

Recommended Books:
1. M.L. Young: Complete Reference b: Internet; 2nd Edition; Tata Mc Graw Hill, 2006.
2. Thomas A. Powel ; Web Design : C.R.; Second Edition; TMH, 2009.
3. Thomas A. Powel ; HTML & XHTML : C.R.; Fourth Edition; TMH, 2008.
4. Harely Hahn: The Internet, Tata Mc Graw Hill.
5. G. Robertson: Hands on HTML, BPB Publications.
6. D.A. Tauber, B. Kienan: Microsoft From Page ; BPB Publications.
7. PHP The Complete Reference, Steven Holzer, Tata McGraw Hill

PMIT202: Management Information System

Max Marks: 100 (ESE: 70 CIA: 30)   Passing marks:40

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I

Introduction to systems and Basic systems concepts: Types of systems, The systems Approach, **Information systems:** Definition and characteristics, types of Information, role of Information in Decision – Making, Sub – systems of information systems: EDP and MIS, management levels, EDP/MIS/DSS.

Introduction to MIS: Meaning and role of MIS, Definition of MIS, Systems approach to MIS, MIS organization within a company. Effectiveness and efficiency criteria. Overview of system analysis and design, feasibility analysis, design, implementation, testing and evaluation, Introduction to Systems Development Life Cycle and its phases.

Unit-II

MIS Planning: MIS structure and components, MIS features, Problem and Derivation of MIS plans, Prioritization and developmental strategies.

Conceptual Design of MIS: Definition of the problem, System objectives and system constraints. Analysis of information source, Alternative system design and selection of optimal system. Conceptual system design document.

Unit-III

Detailed System Design and Implementation: Application of basic system design concepts to MIS, Involvement of end-user and role of MIS department and System Analyst, Role of Top Management during design an implementation. Management and control of MIS function.

Unit-IV

Advanced MIS System Concept and Controls: Transaction processing systems, Office automation systems, Decision Support System, Executive information system, AI and Expert systems. Pitfalls in MIS Planning, Designing and Implementation. MIS in Operation : MIS for Accounting and Finance Function, MIS for Personnel Systems, MIS for Marketing Systems, Production & Inventory system.

Recommended Books:
1. Murdick R.G. Ross J.E. & Claggett J.R. : Information System for Modern Management, 3rd Edn., PHI, 2009.
2. Jawadekar W.S; MIS; Third Edition, TMH,2008.
3. Prasad ML; Prasad Usha; MIS; First edition;Sultan Chand & Sons,2007.
4. Awad Elias M.: System Analysis and Design; 2nd edition; Galgotia Pub., 2004.
5. James A.O Brien : Management Information Systems, Galgotia Pubn.
6. Wigarders K., Svensson A., Sehong L.: Structured Analysis & Design of Information Systems,Mcgraw-Hill Book Co..
7. Locus: Anlaysis, Design and Implementation of Information System, 3rd Edn., McGraw-Hill Book Co.
8. Newman: Designing Integrated Systems for the Office Environment, McGraw-Hill Company

PMIT205: Data Communication and Networking

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)
                                                          Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Data Communication Concepts: Introduction, Communication System, And Communication mode, Data encoding: Analog and Digital data, digital and analog signal, Communication Channels, Synchronous and asynchronous transmission. Bandwidth concepts, channel capacity.
Introduction to Networking: Computer network, Characteristic & advantages of networking, types of network, LAN, MAN, WAN.

Unit-II
Transmission media & Network Topologies: Guided & Unguided media, Twisted pair, coaxial cable, Fiber optics, Radio. VHF and microwaves, Satellite link. Network topology, bus, star, ring, tree, mesh & hybrid topology. Advantages and disadvantages of these topology. Multiplexing Channels and Concept of multi channeling and modulation, pulse code modulation (PCM) Frequency Division multiplexing, Time Division multiplexing, CODECS.

Unit-III
Digital Data Communication Techniques: Asynchronous and Synchronous Transmission - Types of Errors, Error Detection and error Correction methodologies.
Network Standards: Introduction, Layered approach, OSI model functions & responsibilities of each layer.

Unit-IV
Internetworking: Principles of internetworking, Connectivity Devices, Switches, Bridges, Routers, Routing with bridges. Internet and e-mail protocols: SMTP, SLIP, POP, PPP, FTP, HTTP, Wi-Fi Network, Bluetooth, Broadband.

Recommended Books:
1. Introduction to Digital and Data Communications, Michal A Miller, JAICO pub.
2. Data and Computer Communication – Willam Staling, PHI pub.
3. Data Communication & Network – Forouzan (TMH)
4. Computer Networks – A. Tanenbaum, (PHI pub.)
5. Internetworking with TCP/IP Vol-I – Comer (PHI pub.)
6. Data Communications and distributed Networks-V.B, Black, (Prentice Hall pub.)

PMIT251: Java Programming Lab

Examination: Practical

Exercises to be framed so as to cover the topics and tools covered in theory paper

PMIT252: Data Structure Lab

Examination: Practical

Exercises to be framed so as to cover the topics and tools covered in theory paper

PMIT253: Web Designing Lab

Examination: Practical

Exercises to be framed so as to cover the topics and tools covered in theory paper

M.Sc. – IT Third Semester

PMIT301: .Net Technologies

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks:40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit -I
Introduction to .NET: Concept and Features, Microsoft Intermediate Language, Meta Data, .net name spaces, Common Language Runtime, Common Type System, Common Language Specification, .Net Applications. Introduction to C# Programming with respect to ASP.NET.

Unit- II
Basics of ASP. NET: Creating and deploying ASP .NET applications, Web forms, Web controls, working with events, Rich web controls, Custom web controls, Validation controls, Debugging, Master Page .

Unit- III
Introduction to web services: Web services Infrastructure, Web Services: Building, Deploying, publishing, Finding, Consuming.

Unit -IV
Basics of ADO .NET: ADO Objects, (Data Table – Data Views – Data Set, Data Adapter), ADO .NET Providers(OLEDB and SQL Providers). Introduction to XML.

Recommended Books:
1. Herbert Schildt, The Complete Reference C# 3.0, Tata McGraw-Hill
2. ASP.NET 4 Unleashed by Stephen Walther, Kevin Scott Hoffman, Sams Publishing
3. Bill Evjen, Professional ASP.NET 3.5 in C# and VB, Wrox Publication
4. Kogent Solutions, C# 2008 Programming covers. NET 3.5 (Black Book), Dreamtech Press.

PMIT302: Python Programming (From session 2021-22 onwards)

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit – I
Introduction and Overview
Introduction, Comments, Keywords and Identifiers , Variables and Assignment statements, Standard Types, Other Built-in Types, Internal Types, Operators, Built-in Functions. Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Sequences: Strings, Sequences, Strings, String-only Operators, String Built-in Methods, Special Features of Strings, Conditionals and Loops: if statement, else Statement, elif Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement

Unit – II
Lists and Dictionaries
Functions, Lists, List type built in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples, Introduction to Dictionaries, Built-in Functions, Built-in Methods, Dictionary Keys, Sets, Comparing Sets, Mathematical set operations, set comprehensions.
.

Unit – III
Regular Expression and Exception Handling
Regular Expression: Introduction, Special Symbols and Characters for REs, REs and Python, Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions

Unit – IV
OOPs in Python
Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, Class variables, Inheritance, Polymorphism, Type Identification

Recommended Books:
1. Python, The Complete Reference , Martin C Brown, Mac Graw Hill
2. Core Python Programming, Dr. R Nageshwara Rao, Dreamtech Press India Pvt. Ltd
3. Python Programming: Using Problem Solving Approach, Reema Thareja
4. Let us python, Yashvant kanetkar, Aditya Kanetkar, BPB Publications

PMIT303: PHP Programming

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

UNIT-I
Introduction to PHP: Server side scripting vs Client Side Scripting, Evaluation of PHP, Features of PHP
Programming Fundamentals of PHP: Basic Syntax, Variables and constants, Data types, Operators and Expressions
Control Statements: Conditional Statements, Looping Statements (while, do…while, for loop, foreach), Nested Loops, Jumping Statement*.*

UNIT-II
Arrays: Numeric, Associative and Multidimensional Arrays
Functions: Defining a Function, Calling a Function, Parameter passing, Returning value from function
Strings: Creating and Accessing Strings, String Related Library functions, Searching, Replacing, Formatting, Pattern matching

UNIT-III
Form Data Handling: $_GET, $_POST, $_REQUEST Variables
Cookies: Introduction to Cookies, Need of Cookies, Setting up a Cookie, Deleting a Cookie
Session Management: Introduction to Session Management, Creating Session Variables, Retrieving Session Variables
Exception Handling: Understanding Exceptions and errors, Handling Exceptions in PHP, User Defined Exceptions

UNIT-IV
File Handling: Opening and Closing a file, Coping, Renaming and Deleting a file, File opening Modes, Reading and Writing in Files
Database Handling: Connection with MySql Database, Performing basic database Operations (Insert, Delete, Update, Select), Query Handling.

Reference Books:
1. PHP, The CompleteReference, Steven Holzner, TMH
2. Beginning PHP 5.3, Matt Doyle, John Wiley & Sons
3. PHP Beginner's Practical Guide, Pratiyush Guleria, BPB Publications

PMIT304: E-Commerce Application Development

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks: 40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Introduction to E-Commerce: Definition of e-Commerce, objectives, advantages, disadvantages, scope of e-commerce, Traditional Commerce V/s E-Commerce.

Unit-II
E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, Other models-Brokerage Model, Aggregator Model, Info-Mediary Model, Community model, Value chain model, Supply Chain Model. Competitive advantage, Business strategy.

Unit-III
Electronic Data Interchange: Definition of EDI, Types of EDI, EDI standards, EDI Security and Privacy Issues, EDI Implementation, Format of EDI, Electronic-Catalogs, Digital Libraries. E-Governance, E-Buying, E-Selling, E-Banking, E-Retailing.
Network Security: Network Security and Firewalls, Client Server Network, Security Threats, Cyber Law, E-mail.

Unit-IV
E-Payment System: Types of E-Payment Systems (EFT, E-Cash, ECheque, Credit/Debit Card, Smart Card, Digital Tokens and Electronic Purses/ Wallets) Payment Gateways.

Recommended Books:
1. Davis Whiteley: E-Commerece, TataMcHill, Delhi
2. P. T. Joseph: E-Commerece, Addis Anwesley, Delhi
3. R. Kalakola and A.B. Whiston : Frontiers of Electronic Commerce; Addision Wisley , 1996
4. Greensein, Feinman : Electronic Commerce Security, Risk management and Control; TMH, 2000
5. Saily Chan: Electronic Commerce Managment; John Wisley; 1998.
6. David kosiur ; Understanding E-commerce , The cutting edge of business, Tata-McGraw Hill
7. Kamlesh K. Bajaj & Debjani Nag, E-Commerce, The cutting edge of business, Tata-MCGraw Hill
8. Pete Losuin and A.Murphy, Electronic Commerce, A Jaico Book
9. Green Stein "Electronic Commerce", TMH.

PMIT305: Software Engineering and Testing

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks:40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit-I
Software Engineering Fundamentals: Definition of Software, Software Engineering, Software Development Life Cycle, Process Models: Definition, Water Fall Model, Incremental Process Models [Incremental Model, RAD Model], Evolutionary Process Models [Prototyping, Spiral Model, Concurrent Development Model], Specialized Process Models, Specialized Process Models [Component-Based Development Model, Formal Methods Model]

Unit-II
Project Management: Concepts, Software Process and Project Metrics; Software Project Estimation: Project Planning, Software Scope and Resources. Software Project Estimation, Decomposition Techniques. Empirical Estimation Models: COCOMO Model, Software Equation. Project Scheduling and Tracking.

Unit-III
Software Requirements and Analysis: Requirement Engineering Tasks, Requirement Analysis, Analysis Modeling Approaches: Data Modeling, Flow-Oriented Modeling, Object Oriented Analysis.
System Design: Design Concepts, Design Models: Data Design, Architectural Design, Interface Design and Component-Level Design.

Unit-IV
Software Testing: Software Testing Fundamentals, Testing Strategies: Unit Testing, Integration Testing, Validation Testing, System Testing. Testing Approaches: Black-Box Testing and White-Box Testing. Difference between Black Box Testing and White Box Testing Approaches.
Software Quality Assurance: Quality Concepts, Software Quality Assurance, Software Reliability.
Advance Topics in Software Engineering: Computer Aided Software Testing Tools, Software Reengineering.

Recommended Books :
1. Software Engineering – A Practitioners Approach Roger S. Pressman, 3rd /4th Edition, Mcgraw Hill, International Education.
2. An Integrated Approach To S/w Engineering, Pankaj Jolote, 1st / 2nd Edition, Narosa.
3. Software Engineering – A Programming Approach, D. Belie I. Moray, J. Rough, PHI.
4. Software Testing Techniques, Barrios Bier, 2nd Edition, Van N Ostrand Reinhold.

PMIT351: .Net Lab
Examination : Practical
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PMIT352: Python Lab
Examination : Practical
Exercises to be framed so as to cover the topics and tools covered in theory paper.

PMIT353: Computer Graphics Lab
Examination : Practical
Exercises to be framed so as to cover the topics and tools covered in theory paper.

M.Sc – IT Fourth Semester

PMIT401 Elective Paper I: Artificial Intelligence and Expert Systems

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks:40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit – I
Concept of intelligence, Artificial intelligence, definition turning test, areas of application. Search techniques, state space, Production rules, problem characteristics. Production system characteristic, depth first, breadth first search methods.

Unit – II
Heuristic search method, generate and test, hill climbing, best first method, graph search, AND OR search methods, constraint satisfaction, backtracking. Introduction to list and string processing, concept of knowledge, Logic, prepositional and predicate calculus, resolution.

Unit – III
Semiatics nets, frames, conceptual dependency, scripts, Monotonic reasoning, logical reasoning induction, default reasoning, minimalist reasoning, statistical reasoning, Baye's theorem, certainty factors, dempster shafer theory, Fuzzy logic.

Unit – IV
Concept of learning, Knowledge acquisition, rote learning, discovery, analogy. Concept of expert system, need for an expert system, Component and categories of an expert system, Stages in the development of an expert system.

Recommended Books:
1. Elaine rich & Kevin Knight: Artificial Intelligence and Expert System, PHI.
2. Charniak, E.: Introduction of Artificial Intelligence, Narosa Publishing House.
3. Winton. P.H. : LISP, Narosa Publishing House.
4. Marcellus: Expert System Programming in TURBO PROLOG Prentice-Hall Inc. 1989.
5. Clark, K. L. & McCabe, F.G.: Micro-Prolog Prentice-Hall Inc. 1987.

PMIT401 Elective Paper II: Information Protection and Security

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks:40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit – I
Introduction to Cryptography and Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services. Conventional Encryption, and Steganography Symmetric and Asymmetric Cipher Schemes, Stream Cipher and Block Cipher, DES and AES

Unit – II
Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128, RC2 Placement & Encryption Function, Key Distribution, Random Number Generation
Public Key Encryption: Public-Key Cryptography: Principles of Public-Key Cryptosystems, RSA Algorithm, Key Management, Fermat's & Euler's Theorem, Primarily, The Chinese Remainder Theorem.

Unit – III
Hash Functions: Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Authentication Protocol, Digital Signature
Standard (DSS).

Unit – IV
Network & System Security: Authentication Applications: Kerberos X.509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (SET), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.

Recommended Books:
1. Kaufman, c., Perlman, R., and Speciner, M., Network Security, Private Communication in a public world, 2nd ed., Prentice Hall.
2. Stallings, W, Cryptography and Network Security: Principles and Practice, 3rd ed., Prentice Hall PTR.
3. Pieprzyk Josef and et.al; Fundamentals of Computer Security, Springer-Verlag, 2008.
4. Trappe & Washington, Introduction to Cryptography, 2nd Ed. Pearson.
5. Johannes A. Buchmann, "Introduction to cryptography", Springer- Verlag.

PMIT401 Elective Paper III: Research Methodology

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks:40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit – I

Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method – Understanding the language of research – Concept, Construct, Definition, Variable. Research Process
Problem Identification & Formulation – Research Question – Investigation Question –
Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance

Unit – II
Research Design: Concept and Importance in Research – Features of a good research design –
Exploratory Research Design – concept, types and uses, Descriptive Research Designs –concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.
Qualitative and Quantitative Research: Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches.

Unit – III
Measurement: Concept of measurement– what is measured? Problems in measurement in research – Validity and Reliability. Levels of measurement – Nominal, Ordinal, Interval, Ratio.
Sampling: Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample– Practical considerations in sampling and sample size.

Unit – IV
Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.
Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish? Ethical issues related to publishing, Plagiarism and Self-Plagiarism.
Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science Discipline.

PMIT402 Elective Paper I: Open Source Operating System

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks:40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit – I
Introduction to open source system software, Linux Architecture (Kernel & shell), Linux file system (inode, Super block, Mounting and Unmounting), Essential Commands (cal, date, echo, printf, bc, script, mailx, passwd, who, uname, tty, sty, man), File and Directory types, Managing Files (pwd, cd, mkdir, rmdir,).

Unit – II
Handling ordinary Files, Basic File Attributes (Ownership and Access Permissions of files and directories). Process Management in Linux, Signal Handling, System call. I/O Redirection and Piping. Simple Filters (pr, head, tail, cut, paste, sort, uniq, tr), Filters using Regular Expressions (grep, sed).

Unit – III
Introduction to Shell, Types of Shell, Editors(basics of vi), Shell Programming-Shell scripts, Shell control statements, Variables, if-then-else, case-switch, While, Until, For, Set and Shift, Trap, Find, string handling, Shell Meta characters, Shell Scripts, Shell keywords, Built in Commands, Shell Procedures and Reporting, Handling documents.

Unit – IV
 System Administration– root, administrator privileges, security, Booting and Shutting down, managing disk space, device files, Advanced System Administration (partitions and file system, fdisk, mkfs, mounting and unmounting filesystems)

Recommended Books :
1.Linux: The Complete Reference, Sixth Edition by Richard Petersen
2.A Practical Guide to Linux Commands, Editors, and Shell Programming (3rd Edition) by Mark G. Sobell (Author)
3. Your UNIX/Linux: The Ultimate Guide by Sumitabha Das

PMIT402 Elective Paper II: CLOUD COMPUTING

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks:40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit 1
Introduction: Introduction to Cloud Computing, Roots of Cloud Computing: Fundamental concepts of Distributed Systems, Cluster Computing, Grid Computing, and Mobile Computing.

Unit 2
Cloud Models Basics of Cloud Computing Concepts, Characteristics of Cloud Computing, Need for Cloud, Cloud Deployment models: private, public, hybrid and community cloud, Cloud Services: Resource-as-a-Service (RaaS), Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS), Examples of each service.

Unit 3
Cloud Services RaaS: Usage of Physical resources like servers, networks, data center etc, IaaS: Virtualization,. PaaS: Integrated lifecycle platform: Google App Engine, Microsoft Azure, Anchored life cycle platform: Salesforce platform, SaaS: Characterizing SaaS, Salesforce's software environment.

Unit 4
Resource Scheduling for Cloud Computing: - Introduction, Virtual Machine provisioning and Migration Services, Scheduling techniques of Virtual machines for resource reservation, Cloud Service Scheduling hierarchy, Economic models for Resource-allocation scheduling , Heuristic Models for task –execution scheduling : Static Strategies , Dynamic Strategies , Heuristic Schedulers. Cloud Applications Cloud Applications, Cloud challenges, Cloud Security and privacy issues, Mobile Cloud Computing, Integration of Cloud with Wireless Sensor Network and its application.

Reference Books:
1. Cloud Computing Bible by Barrie Sosinsky, Wiley Publication, 2011.
2. Cloud Computing: A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, The McGraw-Hill Publication, 2010.
3. Cloud Computing: Concepts, Technology and Architecture by Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, 1st Edition, Prentice Hall.
4. Cloud Computing: Data-Intensive Computing and Scheduling by Frederic Magoules , Jie Pan, and Fei Teng. CRC Press. Taylors & Francis Group.

PMIT402 Elective Paper III: Mobile Application Development

Max Marks: 100 (ESE: 70   CIA: 30)   *Passing marks:40*

Question Paper pattern for End Semester Exam (ESE)

Max Marks: 70

Part-A will contain 12 very short questions of 1 mark each (attempt any 10).
Part-B will contain 4 questions (1 from each unit) of 5 marks.
Part-C will contain 4 questions (1 from each unit with internal choice) of 10 marks.

Unit – I
Introduction to Android: History of Mobile Software Development, The Open Handset Alliance, The Android Platform, Android SDK, Building a sample Android application.

Unit – II
Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents**,** Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, Working with different types of resources.

Unit – III
Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Unit – IV
Using Common Android APIs: Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data Between Applications with Content Providers, Using Android, Networking APIs, Using Android Web APIs, Using Android Telephony APIs.

Recommended Books :
1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)
2. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd (2011)
3. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd(2009)
4. Sayed Y Hashimi and Satya Komatineni, "Pro Android", Wiley India Pvt Ltd(2009)

PMIT451: Project(Project, Report, Viva)

Two typed and duly bound copies of project report shall be submitted at least 3 weeks before commencement of the Theory/Practical examination which ever commences earlier.

General instructions about preparation of training report

1. The Power Point Presentation has to be prepared for the project report.
2. The Power Point Presentation will be around 10-15 mins, and then question answers. So prepare the number of slides accordingly.
3. The binding for reports will be spiral binding.
4. The format for the reports should be adhered with exactly.
5. The Coding of the Project should not be included in the report.
6. Contents of Index page should include the following parts:
   a. Project Requirements.
   b. Feasibility Study.
   c. Detailed Designing:
   d. List of Figures.
   e. List of DFD.
   f. List of ER-Diagram.
   g. List of Tables.
   i. Testing.
   j. Future Scope.

Page Format of Project Report should be as follows.
Paper: A4
Font: Times New Roman, Bookman Old Style
        Chapter Heading: 16pt, Sub heading: 14pt.
Running Matter: 12 pt
All topics will be numbered accordingly.
Paragraph Gap: 6 Pt Maximum
Line Gap: 1.5
Margins: Left 1.5, Right, Top and Bottom 1 inch

Please Note: Project report of live project in the given format has to be prepared in 3 sets. These reports should have CD containing the soft copy and Power Point Presentation of Project report.

Format of Front Page of Project Report.

Project Report

Submitted to the S. S. Jain Subodh P.G.(Autonomous) College,

University of Rajasthan, Jaipur

Logo of college   **UOR logo**

in Partial fulfillment of the requirement for the degree of

MASTER OF SCIENCE (INFORMATION TECHNOLOGY)

Submitted by
(your name)

Name of Internal Guide   **Name of Training Incharge
(from the company, where you
have undergone training)**

MSc-IT (Academic Session)
(month of deposition and year)

CERTIFICATE

This is to certify that "**your name, S/D/O----------- ** " is/was under training from …… (start date) to

…. (end date) in my supervision for partial fulfillment of the requirement for the award of the Degree

of Master of Science (Information Technology).

During this period he /she has worked on…….(description of training) project as ---------.
I wish for his/her good future.

Date: **Name of Training Incharge**

                                                                           Designation