SCHEME OF TEACHING AND EXAMINATIONS

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

FIRST SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P	L+(T+P)/2	Th	Ses	Pr	Total	Th	Ses	Pr	Total
Msc(IT)101	Object Oriented Programming with C++	3	2	-	4	100	50	-	150	40	30	-	70
Msc(IT)102	Mathematical Foundations Of Computer Science	3	2	-	4	100	50	-	150	40	30	-	70
Msc(IT)103	Essentials of Information Technology	3	2	-	4	100	50	-	150	40	30	-	70
Msc(IT)104	Data Structure through algorithms with ‘C”	3	2	-	4	100	50	-	150	40	30	-	70
Msc(IT)105	Operating System (with Linux as case Study)	3	2	-	4	100	50	-	150	40	30	-	70
Msc(IT)106	Programming Lab C++	-	-	3x2	3	-	25	100	125	-	15	50	65
Msc(IT)107	Data Structure through algorithms ‘ ”Lab	-	-	3x2	3	-	25	100	125	-	15	50	65
	TOTAL	15	10	12	26	500	300	200	**1000**	200	180	100	**480**

FIRST SEMESTER : M. Sc-101

Object Oriented Programming with 'C++ '

Max Marks: 100
Min Marks : 40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I : Introduction to OOP

Advantages of OOP, The Object Oriented Approach, and Characteristics of object oriented languages- Object, Classes, Inheritance, Reusability, and Polymorphism. OMT.

UNIT – II : Language Fundamental

Overview of C++: History of C++, Data Types - int, float, char, double, void. Constant and Variables. Operators and Expression: Arithmetic Operators, Relational Operators, Logical Operators, Conditional Operators, Bitwise Operators. Control constructor: if , if-else, nested if-else, while(), do-while() , for(;;), break, continue, switch, goto. Storage class.

UNIT – III : Structure and Function

Structures : A Simple structures ,specify the structures, Defining a structure variable, Accessing structures member. Enumeration data type.

Function: Function Declaration, Calling Function, Function Defines, Passing Argument to function, Passing Constant, Passing Value, Reference Argument, Passing struct variable, Overloaded Function, Inline Function, Default Argument, return statement, returning by reference.

Array: Defining array, array element , initiation array, multi dimensional array, passing array to function.

UNIT – IV : Object Classes and Inheritance

Object and Class, Using the class, class construct, class destructors, object as function argument, struct and classes, array as class member, operator overloading. Type of inheritance, Derive class, Base class. Access specifier: protected. Overriding, member function, String, Templates.

UNIT – V

Pointers and Virtual Function

pointers: & and * operator pointer variables, pointer to void ,pointer and array, pointer and function, pointer and string, memory management, new and delete, pointer to object, pointer to pointer, link list.Virtual Function: Virtual Function, Virtual member function, accesses with pointer, Late binding, pure virtual function, Friend function, Friend class, static function, this pointer.

File and Stream

C++ streams, Stream class, string I/O, char I/O, Object I/O, I/O with multiple object, File pointer, Disk I/O,

RECOMMENDED BOOKS :

1. Object Oriented Programming : McGregor and Sykes S A, 1992 Van Nostrand.
2. The C++ Programming Language : Strustrp B,Addision Wasley.
3. Object Oriented Programming in C++ : Lafore R, Galgotia Publications.
4. Introduction to Object Oriented Programming : Witt KV, Galgotia Publications.
5. Object Oriented Programming : Blaschek G, Springer Verlag
6. Object Data Management : Cattel R, Addison Wasley.
7. Modern Database Systems : Kim W, ACM Press, Addision Wesley.

FIRST SEMESTER : MSc(IT)-102
Mathematical Foundation Of Computer Science

Max Marks : 100
Min Marks : 40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I : Mathematical Logic, Sets Relations and functions

Mathematical Logic : Notations, Algebra of Propositions & Propositional functions, logical connectives, Truth values & Truth table Tautologies & Contradictions, Normal Forms, Predicate Calculus, Quantifiers.

Set Theory: Sets, Subsets, Power sets, Complement, Union and Intersection, De-Morgan's law Cardinality, relations: Cartesian Products, relational Matrices, properties of relations equivalence relation functions: Injection, Surjection, Bijection, Composition, of Functions, Permutations, Cardinality, the characteristic functions recursive definitions, finite induction.

UNIT – II : Lattices & Boolean Algebra

Lattices : Lattices as Algebraic System, Sub lattices, some special Lattices(Complement, Distributive, Modular).

Boolean Algebra : Axiomatic definitions of Boolean algebra as algebraic structures with two operations, Switching Circuits.

UNIT – III : Groups Fields & Ring

Groups : Groups, axioms, permutation groups, subgroups, co-sets, normal subgroups, free subgroups, grammars, language).

Fields & Rings : Definition **,** Structure, Minimal Polynomials, Irreducible Polynomials, Polynomial roots & its Applications.

UNIT – IV : Graphs

Graphs : Simple Graph, Multigraph & Psuedograph, Degree of a Vertex, Types of Graphs, Sub Graphs and Isomorphic Graphs, Operations of Graphs, Path, Cycles and Connectivity, Euler and Hamilton Graph, Shortest Path Problems BFS(Breadth First Search , Dijkastra's Algorithm, Representation of Graphs, Planar Graphs, Applications of Graph Theory.

UNIT – V : Trees

Trees : Trees, Properties of trees, pendant vertices in a tree, center of tree, Spanning tree, Binary tree, Tree Traversal, Applications of trees in computer science.

BOOKS RECOMMENDED :

1. A text book of Discrete Mathematics – By Swapan Kumar Sarkar.(S.Chand & company Ltd.).
2. Discrete Mathematical structure with applications to computer science - By J.P Trembly & R.P. Manohar.
3. Discrete Mathematics -By K.A Ross and C.R.B writht.
4. Discrete Mathematics Structures for computer science -By Bernard Kohman & Robert C. Bushy.
5. Discrete Mathematics -By Seymour Lipschutz Mare Lipson. Tata McGraw-Hill Edition.

FIRST SEMESTER : M. Sc-103
Essentials Of Information Technology

Max Marks : 100
Min Marks : 40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I : Introduction –

Basics concept of IT, concept of data and information,. Data processing, History of computer, Data processing, organization of computers and input and output device, storage device, and file organization.

UNIT – II : Software concept -

System software, application software, utility package, compilers, and interpreters, operating system, elementary command of DOS, UNIX and WINDOWS (file handling directory, management and general purpose user interfacing command).

UNIT – III : Computer languages –

Machine languages, assembly languages, high level languages, 4^{th} generation languages, general purpose, concept of oops and SQL

UNIT – IV : Communication and network technology -

Communication and system elements, communication mode (Analog and Digital, Synchronous and Asynchronous, Simplex, Half duplex, Full duplex, circuit switching), communication media (Speed and capacity, twisted pair, coaxial cable, optics, wireless), common network, protocols (ISO/OS, reference model, TCP/IP).

UNIT – V : Internet

Technical foundation of Internet- Client server computing, Distributed Computing, Domain naming system, DNS Server, Internet Security – Fire walls, Encryptions etc.

Internet Applications - E-mail, WWW, E-commerce, Teleconferencing,

Application of Information Technology - State of Art Application of IT, Application of IT in business, Industry, home, education and training entertainment, science and engineering and medicine.

BOOKS RECOMMENDED :

1. Fundamental of Computer - V.Rajaraman
2. Computer today - Sanders D.H
3. Information technology today - S.Jaiswal

FIRST SEMESTER : M.Sc.-104

Data Structure Through Algorithms with C

Max Marks : 100
Min Marks : 40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I : Introduction and Preliminaries -

Introduction, Basic terminology, Elementary data organization, Data structure, Data structure operation, Algorithms : complexity, time-space Tradeoff.. Mathematical Notation and functions, Algorithmic Notation, Control Structures, Complexity of Algorithms, Sub algorithms, Variables, Data Type.

UNIT – II : String Processing, Arrays, Records And Pointers –

Basic Terminology, Storing String, Character Data Type, String Operations, Word Processing, Pattern Matching Algorithms. Linear Array, Representation of linear Array in Memory, Traversing Linear Arrays, Inserting And Deleting, Sorting; Bubble Sort, Searching; Liner Search, Binary Search, Multidimensional Array, Pointers; Pointer Array, Records; Record Structures, Representation of Records in Memory; Parallel Arrays, Matrices, Sparse Matrices.

UNIT – III : Linked Lists, Stacks, Queues, Recursion -

Linked list, Representation of linked lists in memory, Traversing a linked list, Searching a linked list, Memory Allocation; Garbage Collection, Insertion into a linked List, Deletion from a Linked List, Header Linked List, Two- Way Linked Lists. Stacks, Array Representation of Stack, Arithmetic Expressions; Polish Notation, Quicksort, an application of Stacks, Recursion, Tower of Hanoi, Implementation of Recursive Procedures by Stacks, Queues, Deques, Priority Queues.

UNIT – IV : Trees & Graphs -

Binary Trees, Representing Binary Trees in Memory, Traversing binary tree, Traversal Algorithms using stacks, header nodes; threads, Binary Search Tree, Searching and Inserting in Binary Search Tree, Deleting in Binary Search tree, Heap; Heap sort, Path Lengths; Huffmans Algorithms, General Tree. Graph Theory Terminology, Sequential Representation of Graph; Adjacency Matrix, Path Matrix, Linked Representation of Graph.

UNIT – V : Sorting And Searching –

Sorting, Insertion Sort, Selection Sort, Merging, Merge Sort, Radix Sort, Searching and data modification, hashing.

BOOKS RECOMMENDED :

1. Data Structure **- Seymour Lipschutz (Schaum's Series).**

2. Data Structure & Program Design **- Robert L. Kruse, 3rd Ed., Prentice Hall.**

FIRST SEMESTER : M. Sc.-105

Operating System (with Linux as case Study)

Max Marks: 100
Min Marks: 40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

Introduction:

What is operating system, basic concept, terminology, batch processing, spooling, multiprogramming, time sharing, real time systems, protection, multiprocessor system, operating system as resource manager, process view point, memory management, process management, device management and information management, other views of operating system, historical, functional job control language and supervisor service control.

UNIT – II

Memory Management:

Preliminaries of memory management, memory handling in M/C, relocation, swapping and swap time calculation, multiple partitions, partitioned allocation MFT, fragmentation, MVT, compaction, paging, job scheduling implementation of page tables, shared page, virtual memory-overlays, concepts of virtual memory demand page, memory management and performance, page replacement and page replacement algorithms. Allocation algorithms. Storage hierarchy disk and drum scheduling - physical characteristics fcfs scheduling SCAN, short of seek time first disk scheduling algorithms sector queuing.

UNIT – III

Information Management (File System) :

File concept, file type, typed based system, disk based system, general model of file system, file directory maintenance, symbolic file system, basic file system, physical file system, file support device directory, access methods free space management contiguous, linked allocation and indexed allocation performances.

Processor Management (CPU Scheduling) :

Reviewing of multiprogramming concept, scheduling concept, basic concept, CPU I/O burst cycle process state, PCB (Programme Control Block) scheduling queries, schedulers, scheduling algorithms - performance criteria, first-come - first served shortest job - first priority, preemptive algorithm, round robin, multilevel queues and multilevel feedback queues, algorithm evolution, multiprocessor scheduling , separate system, coordinated job scheduling, master / slave scheduling.

UNIT – IV

Dead Locks :

The dead lock problem - dead lock definition, dead lock detection, detection algorithm usage, dead lock characterization, resource allocation graph, dead lock prevention, mutual exclusion, hold and wait, no preemption and circular wait, dead lock avoidance-bankers algorithm. Recovery from deadlock process termination, resource preemption, combined approach to deadlock handling.

UNIT – V

Device Management :

Dedicated, shared and virtual devices, sequential access and direct access device, channel and control units, I/O schedulers. Introduction to assembly language programming, introduction to I/O programming, introduction to interrupts and their programming.

Unix (Operating System) :

History, design principle, programmer interface, user interface, file system, process management, I/O system, interprocess communication.

BOOKS RECOMMENDED :

1. Principles of Operating System - Peterson.
2. Operating System - Mandinick & Donovan.

SCHEME OF TEACHING AND EXAMINATIONS

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

SECOND SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit L+ (T+P)/2	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P		Th	Ses	Pr	Total	Th	Ses	Pr	Total
Msc(IT)201	Java & HTML	3	2	-	4	100	25	-	125	40	15	-	55
Msc(IT)202	Computer System Architecture	3	2	-	4	100	25	-	125	40	15	-	55
Msc(IT)203	RDBMS & ORACLE	3	2	-	4	100	25		125	40	15	-	55
Msc(IT)204	Program Based Numerical Analysis	3	2	-	4	100	25	-	125	40	15	-	55
Msc(IT)205	Computer Networks & Data Communication	3	2	-	4	100	25	-	125	40	15	-	55
Msc(IT)206	Programming Lab Java & HTML	-	-	3x2	3	-	50	100	150	-	30	50	80
Msc(IT)207	Programming Practice	-	-	2	1	-	50	50	100	-	30	25	55
Msc(IT)208	Common Software	-	-	2	1	-	50	50	100	-	30	25	55
Msc(IT)209	Seminar	-	-	2	1	-	25	-	25	-	15	-	15
	TOTAL	15	10	12	26	500	300	200	**1000**	200	180	100	**480**

SECOND SEMESTER - M. Sc. (I.T.) 201
Programming in JAVA & HTML

Max Marks: 100
Min Marks : 40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

1. **Introduction to java programming**

An overview of Java: Object Oriented Programming, Features of Java, Java Virtual Machine, Java Environment: Java Development Kit, Java Standard Library, Data Types, Variables: Declaring a variable, Dynamic Initialization, The scope and life time of variable, Type conversion and Casting: Narrowing and Widening Conversions, Numeric Promotions, Type Conversion Contexts; Operators: Arithmetic Operators, Relational Operators, Logical Operators, Bit wise Operators, Conditional Operators, new operator, [ ] and instance of operator. Control Statements: Java's Selection statement, Iteration Statement, Jump Statement, Array: Declaring Array variables, Constructing an Array, Initializing an Array, Multidimensional Arrays, Anonymous Arrays.

2. **Define the Class and interface**

Introducing Classes: Class Fundamentals, Declaring Object, Assigning Object Reference Variables, Defining Methods, method overloading, Using objects as parameter, Constructors, Garbage collection, finalize () method. Inheritance: Inheritance basic, method overloading, object reference this and super, Chaining constructor using this () and super (), Member accessibility modifier: public, protected, default accessibility of member, private protected, private, Package: Define package, CLASSPATH, importing package, Interface: Define an interface, implementing interface, extending interface, variable in interface, Overview of nested class: Top level nested class and interface, Non static inner class, Local class, Anonymous class.

UNIT – II

3. **Exception handling and Multithreading**

Exception Handling: Exception types, Uncaught Exception, Using try and catch, multiple catch, nested try block, throw, and throws, finally.

Multithreading: creating thread, Thread priority, synchronization, thread Scheduler, Running & yielding, sleeping and waking up, waiting and notifying, suspend and resume, miscellaneous method in thread class.

4. **Input output, Networking and Fundamental class of java**

Object class, String class, StringBuffer class, Wrapper class, Math class, Collection: Collection interface, List interface, Set interface sorted interface, ArrayList class, LikedList class, TreeSet, Comparator, Vector, Stack.

Input output classes and interface: File, BufferStream, CharacterStream, and Random Access for files, Object Sterilization.

Networking: Socket overview, Client/Server, Proxy Server, Network class and interface, TCP/IP client socket, TCP/IP Server socket, URL Connection, Datagrams, DatagramPackets.

UNIT – III

5. **Applet programming and AWT**

Applet: Applet and Application program, Creating Applets, Applet Life Cycle, Applet and Thread, Supplying Applet parameter, Using Images and Sound in Applets, JAR files, Applet Security.

Introducing the AWT: Overview of the java.awt package, Component and Containers: Component, Container, Panel, Applet, Window, Frame, and Dialog classes. Working with Graphics, Working with Fonts, Working with Colors, GUI Control Components: Button, Canvas, Checkbox and CheckboxGroup, Choice, List, Label, Scrollbar, TextField and TextArea, Frame, Menu Bars and Menu

Layout Management: Layout Management Policies, FlowLayout, GridLayout, BorderLayout, CardLayout, GridBagLayout, Customized Layout.

Event Handling: Overview of Event Handling, Event Hierarchy, Event Delegation Model, Event Adapters, Low Level Event Processing.

6. **Advance features of java**

JDBC: JDBC/ODBC Bridge, The Driver manage class, the java.sql package, data manipulation: Insert, Update, Delete Record, Data navigation: ResultSet

BDK: What is java Beans, Advantages of java Beans, the Bean Developer Kit, Jar Files, Introspection, Developing a New Bean, Using Bound Properties, Using BeanInfo interface, The java Beans API.

UNIT – IV

7. **HTML Basics & Web Site Design Principles –**

Concept of a Web Site, Web Standards, What is HTML? HTML Versions, Naming Scheme for HTML Documents, HTML document/file, HTML Editor, Explanation of the Structure of the homepage, Elements in HTML Documents, HTML Tags, Basic HTML Tags, Comment tag in HTML, Viewing the Source of a web page, How to download the web page source? XHTML, CSS, Extensible Markup Language (XML), Extensible Style sheet language (XSL), Some tips for designing web pages, HTML Document Structure. HTML Document Structure-Head Section, Illustration of Document Structure,<BASE> Element,<ISINDEX> Element,<LINK> Element ,META ,<TITLE> Element,<SCRIPT> Element ,Practical Applications, *HTML Document Structure-Body Section:*-Body elements and its attributes: Background; Background Color; Text; Link; Active Link (ALINK); Visited Link (VLINK); Left margin; Top margin ,Organization of Elements in the BODY of the document: Text Block Elements; Text Emphasis Elements; Special Elements -- Hypertext Anchors; Character-Level Elements; Character References ,Text Block Elements: HR (Horizontal Line); Hn (Headings) ; P (Paragraph); Lists; ADDRESS ; BLOCKQUOTE; TABLE; DIV (HTML 3.2 and up) ; PRE (Preformatted); FORM ,Text Emphasis Elements, Special Elements -- Hypertext Anchors ,Character-Level Elements: line breaks (BR) and Images (IMG),Lists ,ADDRESS Element, BLOCKQUOTE Element, TABLE Element ,COMMENTS in HTML ,CHARACTER Emphasis Modes, Logical & Physical Styles ,Netscape, Microsoft and Advanced Standard Elements List, FONT, BASEFONT and CENTER.

UNIT – V

Image, Internal and External Linking between WebPages

Netscape, Microsoft and Advanced Standard Elements List, FONT, BASEFONT and CENTER Insertion of images using the element IMG (Attributes: SRC (Source), WIDTH, HEIGHT, ALT (Alternative), ALIGN),IMG (In-line Images) Element and Attributes; Illustrations of IMG Alignment, Image as Hypertext Anchor, Internal and External Linking between Web Pages

Hypertext Anchors, HREF in Anchors, Links to a Particular Place in a Document, NAME attribute in an Anchor, Targeting NAME Anchors, TITLE attribute, Practical IT Application Designing web pages links with each other, Designing Frames in HTML. Practical examples.

8. **Creating Business Websites with Dynamic Web Pages** –

Concept of static web pages and dynamic web pages, Introduction to scripting, Types of Scripting languages, Scripting Files, Client Side Scripting with VB/Jscript/JavaScript, Practical examples of Client side scripting. Identifying Objects & Events, and Creating & Implementing Common Methods,**.** Hosting & promotion of the web site, Domain Name Registration, Web Space allocation, Uploading / Downloading the website- FTP, cute FTP. Web Site Promotion Search Engines, Banner Advertisements.

Reference Book:

1. The Complete Reference Java 2 - Herbert Schildt, Publisher- TMH
2. A Programmer Guide to Java - Khlid A. Mughal, R.W. Rasmussen Publisher- Addison Wesley
3. Introduction to HTML by - Kamlesh N. Agarwala, O.P.Vyas, P A. Agarwala. (Kitab Mahal Publications).
4. Web Enabled Commercial Application Java 2 - Ivan Bayross Publisher- B.P.B.

SECOND SEMESTER - M. Sc. (I.T.) 202
Computer System Architecture

Max Marks: 100
Min Marks: 40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

Representation of Information

Number system, Integer & Floating point representation Character code (ASCII, EBCDIC), Error Detect and Correct code, Basic Building Blocks, Boolean Algebra, MAP Simplification, Combination Blocks, Gates, Multiplexers, Decoders, etc Sequential building block, flip-flop, registers, counters, ALU, RAM etc.

UNIT – II

Register transfer language and micro operations

Concepts of bus, data movement along registers, a language to represent conditional data transfer, data movement from its memory, arithmetic and logical operations along with register transfer timing in register transfer

UNIT – III

Basic Computer Organization and Design

Instruction code, Computer Instructions, Timing and Control, Execution of Instruction, Input and Output Interrupt, Design of Computer.

Computer Software

Programming Language, Assembly Language, Assembler, Program Loops, Input/Output Programming, System Software. Central Processor Organization: - Processor Bus Organization, Arithmetic Logic Unit, Stack Organization, Instruction Formats, Addressing modes, Data transfer and Manipulation, Program Control, Microprocessor Organization, Parallel Processing,.

UNIT – IV

Input –Output Organization

Peripheral Devices, Input/Output Interface, Asynchronous Data Transfer, Direct Memory Access (DMA), Priority Interrupt, Input-Output Processor, Multiprocessor System Organization, and Data Communication Processor**.**

UNIT – V

Memory Organization

Auxiliary Memory, Micro Computer Memory, Memory Hierarchy, Associative Memory, Virtual Memory, Cache Memory, Memory Management Hardware.

BOOKS RECOMMENDED :

1. Computer System Architecture - M. Morris Mano (PHI).
2. Digital Computer Electronics - Malvino.
3. Digital Computers and Logic Design - M.Morris Mano (PHI).
4. Structured Computer Organization - Andrew M. Tanenbanm (PHI).

SECOND SEMESTER - M. Sc. (I.T.) 203
RDBMS & ORACLE

Max Marks : 100
Min Marks : 40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

Overview of Database Management -

Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases, Client/Server databases, Object-oriented databases, Object-relational databases, Introduction to ODBC concept.

UNIT – II

Relational Model -

Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features, Introduction to UML, Representation in UML diagram (Class Diagram etc.).

UNIT – III

Structured Query Language

Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT…FROM, WHERE… GROUP BY… HAVING… ORDERBY….), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces.

UNIT – IV

Relational Database Design-

Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization, Clustering of tables, Clustering indexes.

UNIT – V

Introduction to Query Processing and Protecting the Database

Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base - Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL.

Data Organization -

File Organization: -Fixed length records, variable length records, Organization of records in files, Indexing: - indexed files -B-tree, B+-tree, and Hashing Techniques.

BOOKS RECOMMENDED :

1. Database system concept - **H. Korth and A. Silberschatz, TMH**
2. Data Base Management System - **Alexies & Mathews [Vikas publication]**
3. Data Base Management System - **C. J. Date [Narosha Pub.]**
4. Data Base Management System - **James Matin**
5. Principles of Database System - **Ullman**
6. An Introduction to database systems - **Bipin Desai, Galgotia Publication.**
7. Database Management System - **A. K. Majumdar & P.Bhattacharya, TMH**

SECOND SEMESTER - M. Sc. (I.T.) 204
Program Based Numerical Analysis

Max. Marks: 100
Min Marks:40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice. **Simple/Scientific calculators are allowed.**

UNIT – I

Solution of Polynomial and Transcendental Algebraic Equations

Bisection method, Regulafalsi method & Newton's method, Solution of Cubic & Biquadratic Equation, Complex roots of polynomial equations.

UNIT – II

Simultaneous Equations and Matrix

Gauss-Jordan method, Cholesky's method, Reduction to lower or upper Traingular forms, Inversion of matrix, method of partitioning, Characteristics equation of matrix, Power methods, Eigen values of matrix, Transformation to diagonal forms.

UNIT – III

Curve-Fitting from Observed Data

Divided difference table for evenly or unevenly spaced data, polynomial curve-fitting - Newton's, Gauss and Langranges form of interpolation and Divided Differences, method of least square for polynomials,.

UNIT – IV

Numerical Differentiation and Integration

Forward and Backword differential operators, Newton - cotes integration formula : Trapezoidal Rule, Simpson's Rule, Boole's Rule, Weddle Rule, Legendre's rule, method of weighted coefficients.

UNIT – V

Solution of Differential Equations

Numerical Solution of ordinary differential equations, one step method : Taylor's Series, Predictor-Corrector Method, Euler's Method, Runga-Kutta Method, Milne's method.

BOOKS RECOMMENDED

1. *Garewal* - Numerical methods
2. *Gupta & Mallic* : Numerical Methods
3. *Hamming R.W.* : Numerical methods for scientist & Engineers. (McGraw Hill)
4. *Conle S.D.* : Elementary numerical analysis
   Carl De Boor (International Book Company London)
5. *Jain M.K.* : Numerical methods for Science and Engineering
   Iyengar S.R.K calculations (John Willey & Sons)

SECOND SEMESTER - M. Sc. (I.T.) 205
Computer Networks And Data communication

Max. Marks: 100
Min Marks:40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

Introduction to Computer Networking

The Concept of Networking, Data Communication, Required network elements, The role of Standards Organization. Line Configuration, Various Topologies, Transmission Mode, Categories of Networks- LAN, MAN, WAN. The benefits of a Computer Networks.

The OSI and TCP/IP Reference Model

The Concept of Layered Architecture, Design Issues for the Layers. Interfaces and services, Detailed Functions of the Layers. Comparison between OSI and TCP/IP Reference model.

UNIT – II

Transmission of Digital Data

Shannon's and Nyquist theorems for maximum data rate of a channel. Transmission media- Co-axial, UTP, Fiber optic and wireless. Analog and digital data Transmission- parallel and serial transmission. DTE-DCE interface using RS-232C. Study of modems- 56k and Cable Modem. Modem standards.

Multiplexing and Switching

The Concept of Multiplexing- FDM, TDM, WDM. The Concept of Switching- Circuiting, Message switching, Packet switching.

UNIT – III

Data Link Layer and Routing Algorithms

Line Discipline, Flow Control- stop and wait, sliding window, Go back N, Error Control- ARQ stop and wait, sliding window ARQ. HDLC, SLIP, PPP. Multiple access protocols- ALOHA, Slotted ALOHA, CSMA/CD. IEEE standards for LAN's and MAN's. The IP protocol, and its header. IP address classes and subnet mask. The concept of ICMP, ARP, RARP, RSVP, CIDR and Ipv6.

Routing algorithms- shorted path first, Distance Vector, Link State. Congestion Control-The leaky bucket and Token bucket Algorithms.

UNIT – IV

Transport Layer

The Concept of client and Server in terms of Socket addressing in Transport layer. Two way and three-way handshaking. TCP header.

Network Performance Issues. The Concept of Domain Name System, Various Resource Records. Architecture and services of E-mail (RFC-822 and MIME). The Concept of World Wide Web- server side and client side.

ATM

The concept of ATM, ATM Adoption layers- AAL1, AAL2, AAL3/4, AAL5, Comparison of AAL protocols. Cell formats for UNI and NNI. Service Categories, Quality of service, Congestion Control in ATM.

UNIT – V

Comparative study of Networking Technologies

X.25, Frame Relay, ATM, SONET, SMDS, ISDN.

Network Security

The Importance of Security in Networking. Traditional Cryptography, Data Encryption Standards, RSA algorithm.

BOOKS RECOMMENDED

1.	Computer Networks–	A S Tanenbaum
2.	Data Communication and Networking-	Forouzan

M.Sc.(IT) -207 DATA COMMUNICATION AND NETWORKING

1. Running the Diagnostic utility for NIC provided with the Driver Floppy/CD.
2. Demonstration of UTP Flat and Cross Cable Crimping.
3. Configuration of Windows 98 Peer-to-Peer Networking.
4. Installation of Windows 2000 server along with Common Software Installations.
5. Concept of Active Directory and DNS with their Configuration in Windows 2000.
6. User and Group Administration in Windows 2000 Server.
7. Implementation of NTFS File and Folder permission and Security.
8. Windows 2000 Server as a DHCP Server Installation and Configuration.
9. Windows 2000 Server as a WINS Server Installation and Configuration.
10. Implementation of Monitoring Tools.
11. Interconnectivity with Windows 98, Linux 8.0.
12. Implementation of Terminal Services on Windows 2000 Server.
13. Installation of Oracle 8i on 2000 Server and Network Client on WIN98 and Connectivity between them.

M.Sc.(IT) –208 Common Software - Programming In Visual Basic

1: Introduction to visual Basic

Editions of Visual Basic, Event Driven Programming, Terminology, Working environment, project and executable files, Understanding modules, Using the code editor window, Other code navigation features, Code documentation and formatting, environment options, code formatting option, Automatic code completion features.

2:Creating Programs

Introduction to objects, Controlling objects, Properties, methods and events, Working with forms, Interacting with the user: MsgBox function, InputBox function, Code statements, Managing forms, Creating a program in Visual Basic, Printing.

3:Variable and Procedures

Overview of variables, Declaring, Scope, arrays, User-defined data types, constants working with procedures, Working with dates and times, Using the Format function, Manipulating text strings.

4:Controlling Program Execution

Comparison and logical operators, If…Then statements, Select Case Statements looping structures, Using Do…Loop structures, For…Next statement, Exiting a loop.

5:Working with Controls

Types of controls, Overview of standard controls, Combo Box and List Box, Option Button and Frame controls Menu, Status bars, Toolbars, Advanced standard controls, ActiveX controls, Insertable objects, Validation.

6: Error Trapping & Debugging

Overview of run-time errors, error handling process, The Err object, Errors and calling chain, Errors in an error-handling routine, Inline error handling, Error-handling styles, General error-trapping options Type of errors, Break mode Debug toolbar, Watch window, Immediate window, Local window, Tracing program flow with the Call Stack.

7 Sequential and Random Files:

Saving data to file, basic filling, data analysis and file, the extended text editor, Random access file, the design and coding.

8 :Data Access Using the ADO Data Control

Overview of ActiveX data Objects, Visual Basic data access features, Relational database concepts Using the ADO Data control to access data, Overview of DAO, RDO, Data Control, structured query language (SQL), Manipulating data Using Data Form Wizard.

9:Report Generation:

Overview of Report, Data Report, and Add groups, Data Environment, Connection to database Introduction to Crystal Report Generator.

10:Advances Tools:

Overview of drag and drop, Mouse events, Drag and drop basics, Date Time Control, Calendar, Print Dialog, MDI (Multiple Document Interface).

BOOK RECOMMENDED:

Mastering Visual Basic 6 Fundamentals – By Microsoft
Mastering in Visual Basic – By BPB Publications.
Introduction to VB Programming – V.K.Jain

SCHEME OF TEACHING AND EXAMINATIONS
MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

THIRD SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P	L+(T+P)/2	Th	Ses	Pr	Total	Th	Ses	Pr	Total
Msc(IT)301	AI & Expert System	3	2	-	4	100	25	-	125	40	15	-	55
Msc(IT)302	Introduction to .Net Technology	3	2	-	4	100	25	-	125	40	15	-	55
Msc(IT)303	Software Engineering	3	2	-	4	100	25	-	125	40	15	-	55
Msc(IT)304	Electives : 1. Data Mining & Warehousing 2. Advanced Computer Architecture	3	2	-	4	100	25	-	125	40	15	-	55
Msc(IT)305	Electives : 1. Mobile Communication 2. Artificial Neural Network & fuzzy logic	3	2	-	4	100	25	-	125	40	15	-	55
Msc(IT)306	Programming Lab	-	-	3x2	3	-	50	100	150	-	30	50	80
Msc(IT)307	Programming Practice / Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
Msc(IT)308	Common Software/Mini-Project	-	-	2	1	-	50	50	100	-	30	25	55
Msc(IT)309	Seminar	-	-	2	1	-	25	-	25	-	15	-	15
	TOTAL	15	10	12	26	500	300	200	**1000**	200	180	100	**480**

THIRD SEMESTER : M.Sc.(IT) – 301
Artificial Intelligence And Expert Systems

Max. Marks: 100
Min Marks:40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

General Issues and overview of AI :

The AI problems; What is an AI technique; Characteristics of AI applications

Problem solving, search and control strategies :

General problem solving; production systems; control strategies: forward and backward and backward chaining Exhaustive searches: Depth first Breadth first search

UNIT – II

Heuristic Search techniques :

Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/Or Graphs; problem reduction and AO* algorithm; constraint satisfaction problems

Game playing :

Minimax search procedure; Alpha-Beta cutoffs; Additional Refinements

UNIT – III

Knowledge Representation :

First order predicate calculus; Skolemization Resolution principle and unification; Inference Mechanisms; Horn's clauses; semantic Networks; frame systems and value inheritance. Scripts; conceptual dependency;

AI Programmiing Languages :

Introduction to Lisp, Syntax and Numeric functions; List manipulation functions; Iteration and Recursion; Property list and Arrays, Introduction to PROLOG.

UNIT – IV

Natural language processing :

Parsing technique; context—context- free grammar; Recursive Transition Nets (RTN); Augmented Transition Nets ((ATN); case and logic grammars; semantic analysis.

Planning :

Overview- An example Domain: The Blocks Word; Component of planning systems: Goal Stack Planning (linear planning); Non-linear planning using goal sets; probabilistic reasoning and Uncertainty; probability theory; Bayes Theorem and Bayesian networks; certainty factor.

UNIT – V

Expert Systems :

Introduction to expert systems and Applications of expert systems; various expert system shells: vidwan; frame work; knowledge acquisition; case studies; MYCIN.

Learning :

Role learning; learning by induction; Explanation based learning.

MAIN READING:

1. Elaine Rich and Kevin knight: Artificial Intelligence-Tata McGraw hill.
2. Dan W. Patterson: Introduction to Artificial Intelligence and Expert Systems. Prentice hall of India.
3. Nills j. Nilson: Principles of Artificial Intelligence; Narosa publishing house.
4. Clocksin & C.S. Melish ; Programming in PROLOG – Narosa publishing house.
5. M.sasikumar ,S.Ramani. etc: Rule based expert system (A practical Introduction) narosa publishing house.

THIRD SEMESTER : M.Sc.(IT) – 302
Introduction to .NET Technology

Max. Marks: 100
Min Marks:40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I : Inside the .NET framework :

Overview of .net framework, Managed Execution process, CLR, common language specification, JIT Compilation , MSIL, Namespaces, Assemblies, metadata, Common Type System, cross language, interoperability, Garbage collection.

UNIT - II : Programming with .NET Framework

Windows form : working with Visual Studio IDE, creating a .NET solution, MDI application, components and controls, Data types, variables, Type conversions, Operators, Control Structures : conditional statements, loops, arrays, types of methods, method data, Introduction to exception handling-exception statements.

UNIT - III : XML, Windows process and File Handling

Types, structures, Enumerations, classes, Interfaces, Working with files-Files and directories, streams, Readers and writers, Reading and writing XML files, XML serialization, processing Transaction, Monitoring and Managing Windows Process, retrieving information about process.

UNIT - IV : Building .NET Framework Applications

Introduction and Architecture of ASP .NET, Differentiate classic ASP and ASP .NET, Web application, Web forms, Form validations – Client side, Server side, controls in web forms, Events in Web form.

UNIT - V : Advanced concepts and Database Programming

Delegates, ADO .NET Architecture, .NET data provider, dataset components, creating database applications using Window forms and web forms (Database connectivity through ADO .NET), Introduction to web services, web services for Mobile application, Remote overview.

BOOKS RECOMMENDED

MSDN online – by Microsoft

THIRD SEMESTER : M.Sc.(IT) – 303
Software Engineering

Max. Marks: 100
Min Marks:40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

Software Engineering Fundamentals :

Definition of software product; software development paradigms; software engineering; knowledge engineering and end user development approaches.

Software Analysis :

Abstraction; partitioning and projection; system specification; software requirements specification (SRS) standards; formal specification method; specification tools; flow based, data based and object orientated analysis.

UNIT – II

Systems Design ;

Idealised and constrained design; process oriented design (Gane and Sarson and Yourdon notations); data oriented design (Warnier – (Orr, E-r modeling); Object oriented design (Booch approach); Cohesion and coupling; Design metrics; design documentation standards.

UNIT – III

Role of Case Tools :

Relevance of case tools; High-end and low–end case tools; Automated support for data dictionaries, data flow diagrams, entity relationship diagrams.

Coding And Programming :

Choice of programming languages; mixed language programming and call semantics; Re-engineering legacy systems; coding standard.

UNIT – IV

Software Quality And Testing :

Software quality assurance; types of software testing (white box, black box, unit, integration, validation, system etc); debugging and reliability analysis; program complexity analysis; software quality and metrics; software maturity model and extensions. Software cost and Time estimation. Functions points; issues in software cost estimation; introduction to the Rayleigh curve3; alglorithmic cost model (COCOM0, Putnam-slim, Watson and feliix); Other approaches to software cost and size estimation (software complexity, Delphi, costing by analolgy)

UNIT – V

Software Project Management :

Planning software projects; work background structures; integrating software, software design and project planning; software project teams; project monitoring and controls.

RECOMENDED BOOKS:

1. Software Engineering: A Practitioner's Approach – by essman Roger, Tata McGraw Hill New delhi, 1991.

2 . An Integrated approach to Software Engineering - by Jalote Pankaj, Narosa: New delhi.1991.

THIRD SEMESTER : M.Sc.(IT) – 304
Elective -1 : Data Mining& DataWarehousing

Max. Marks: 100
Min Marks:40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

Introduction & Data Warehousing and OLAP Technology for Data Mining –

What is data mining?, Data Mining: On what kind of data?, Data mining functionality, Are all the patterns interesting?, Classification of data mining systems, What is a data warehouse?, A multi-dimensional data model, Data warehouse architecture, Data warehouse implementation, Further development of data cube technology, From data warehousing to data mining. Concept of Transaction, Transactional database, Distributed Database, Commit Protocols.

UNIT – II

Data Preprocessing, Data Mining Primitive , Languages and System Architecture -

Why preprocess the data? Data cleaning ,Data integration and transformation, Data reduction, Discrimination and concept hierarchy generation, Data Mining Primitive, Data Mining Query Language, Architecture of data mining system.

UNIT – III

Mining Association Rules in Large Databases –

Association rule mining, Mining single-dimensional Boolean association rules from transactional databases, Mining multilevel association rules from transactional databases, Mining multidimensional association rules from transactional databases and data warehouse, From association mining to correlation analysis, Constraint-based association mining.

UNIT – IV

Classification and Prediction & Cluster Analysis -

What is classification? What is prediction?, Issues regarding classification and prediction, Classification by decision tree induction, Bayesian Classification, Classification by back propagation, Classification based on concepts from association rule mining, Other Classification Methods ,Prediction, Classification accuracy, What is Cluster Analysis?, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

UNIT – V

Mining Complex Types of Data & Applications and Trends in Data Mining -

Multidimensional analysis and descriptive mining of complex data objects, Mining spatial databases, Mining multimedia databases, Mining time-series and sequence data, Mining text databases, Mining the World-Wide Web, Data mining applications, Data mining system products and research prototypes, Additional themes on data mining, Social impact of data mining, Trends in data mining

RECOMENDED BOOKS:

1. Data Mining: Concepts and Techniques -
- Jiawei Han and Micheline Kamber
2. Data Mining Concepts - H. Marget

THIRD SEMESTER : M.Sc.(IT) – 304

Elective - 2 : Advanced Computer Architecture

Max. Marks: 100
Min Marks:40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT I:
Introdution - Feng's and Flynn's classification scheme, Multiprocessor and Multicomputer, UMA, NUMA, COMA, NORMA, memory models, parallel computer and its type. Applications of Parallel Computers.

UNIT II:
System Interconnect Architecture – Static and Dynamic, Hypercube Interconnection network, multistage interconnection networks-architecture and routin, design consideration, throughput delay, blocking and non-blocking properties. Performance Metrics and Benchmarks.

UNIT III:
Principle of pipelining-overlapped parallelism, Linear and non-linear pipelining, reservation table, calculation of MAL. Types of Instruction Pipeline. Arithmetic pipeline designs example –Floating point adder, pipelined multiplier.

UNIT IV:
Advanced processor Technology – RISC, CISC, VLIW architectures, Hazard detection and resolution, functional organization of instruction in IBM 360/91.

UNIT V:
Exploring parallelism in program- multidimensional arrays. Parallel Algorithm-Matrix addition, subtraction, multiplication –block and SIMD. Bitonic sort, sorting on linear array processors. Bernstein's condition, iso efficiency concept.

TEXT BOOKS:.

1. Computer Architecture & Parallel Processing by Kai Hwang and F.A. Briggs-Mc Graw Hill.
2. Advanced Computer Architecture By Kai Hwang –Mc Graw Hill.
3. Parallel Computer Architecture & Programming by- V Raja Raman and C. Shiarammuty-PHI

REFERENCE BOOKS:

Parallel Computing Theory and practice by Michael J. Quinn –Tata Mc-Graw Hill

THIRD SEMESTER : M.Sc.(IT) – 305
Mobile Communication

Max. Marks: 100
Min Marks:40

NOTE :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT – I

Introduction.

Introduction to Mobile Communication, Short history of wireless communication, Applications, Vehicles, Emergency, Business, Replacement of wired network, Location dependent services, infotainment, Mobile and Wireless devices, A Simplified reference model, some open research topics in mobile communication

UNIT – II

Satellite Systems

History of satellite system, Applications of satellite systems, Type of satellite systems, characteristics of satellite systems, satellite system infrastructure, satellite system architecture, Global Positioning system (GPS), Limitations of GPS. Beneficiaries of GPS, Applications of GPS

UNIT – III

Mobile Communication Systems

Introduction, Cellular System Infrastructure,, Registration, Handoff Parameters and Underlying support, Roaming Support Using System Backbone, to Mobile IP, Functions of Mobile IP, Mobile Node, Corresponding Node, Home Network, Foreign Network, Home Agent , Foreign Agent, Care-of Address, IP Packet Delivery, Agent Discovery, Agent Solicitation, Registration, Tunneling, Dynamic host configuration protocol

UNIT – IV

Wireless LANs and PANs

Introduction to IEEE 802.11, Ricochet, Ricochet Wireless Modem, Services Provided by Ricochet , Home RF, Home RF Technology, Hiper LAN, Blue tooth , Advantages and disadvantages of Wireless LAN, Infra red vs radio transmission , introduction to MAC. Technologies influence WLANs / WPANs in future.

UNIT – V

Mobile Adhoc Network

Introduction to Mobile Adhoc Network(MANET), Characteristics of MANET, Applications of MANET, Routing, Need for Routing, Routing Classification, Table-Driven Routing Protocol – Destination Sequenced Distance Vector Routing Protocol, Cluster-Head Gateway Switch Routing, Wireless Routing Protocol. Source initiated On-demand Routing- Adhoc On Demand Distance Vector Routing, Dynamic Source Routing, Temporarily Ordered Routing Algorithms, Hybrib Protocol – Zone Routing Protocol.

RECOMENDED BOOKS:

1. Mobile Communication: Jochen H. Schiller, Pearson Education Publication
2. Introduction to Wireless and Mobile Systems: D.P. Agrawal , Qing-An Zing , Vikas Publishing House

SCHEME OF TEACHING AND EXAMINATIONS
MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

FOURTH SEMESTER

Subject Code	SUBJECTS	Teaching Load Per Week			Credit L+ (T+P)/2	Examination Marks							
						Max. Marks				Min. Marks			
		L	T	P		Sessional Marks of Project Work	Project Viva-Voce	Pr	Total	Sessional Marks of Project Work	Project Viva-Voce	Pr	Total
Msc(IT)401	System Development Project (System Design & Implementation)	5	-	30	20	200	200	-	400	120	100	-	220
	TOTAL	5	-	30	20	200	200	-	400	120	100	-	220

Note : Major Project will include Research Project as well during which candidate may publish Research Paper.