School of Mathematical and Computer Sciences

Department of Information Technology

Syllabus

For

Master of Science in Information Technology (M.Sc.-IT)

For the Batches 2016-17 2017-18 2018-19

Programming Outcomes

PSO1: The Programme is aimed towards building prospective career in the field of Information Technology and is designed with the objective to provide knowledge and skills in the various aspects of Information Technology and core programming.

PSO2: To prepare for advanced education in Information Technology and aim of the programme is to increase the number of skilled IT professionals and academicians.

PSO3: Students will be able to use the techniques, skills and modern hardware and software tools necessary for innovative software solutions. Student get ability to devise and conduct experiments, interpret data and provide well informed conclusions.

PSO4: Student will get skills to analyze a problem and identify and define the logical modeling of solution.

PSO5: Student will be able to select modern computing tool and techniques and use them with dexterity.

PSO6: Understand topics of wide relevance including Internet and Web technologies, Bio Informatics and Wireless and mobile Communication.

PSO7: Gain knowledge of Programming languages and other areas that influence the subject area.

PSO8: The course offers contemporary and cutting edge topics such as: Specialization in Web Mining, Cloud Computing and Information Security with an end result of providing talented hands in the related fields.

COURSE STRUCTURE & SYLLABUS FOR M.Sc. INFORMATION TECHNOLOGY (M.Sc.-IT)

FOR THE YEAR 2016, 2017, 2018

Semester-I

Course Code	Course Title	Credit Value	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MIT-141	Data Structures Using C	4	3	40	60	100
MIT-142	Internet and Web Technologies	4	3	40	60	100
MIT-143	Operating System	4	3	40	60	100
MIT-144	Digital Electronics	4	3	40	60	100
MIT -171	Lab -1: Data Structure	4	3	50	50	100
MIT -172	Lab -2: Web Technologies	4	3	50	50	100
Total		**24**	**-**	**260**	**340**	**600**

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-141	Data Structure Using C	3	40	60	100	5	0	0	4

Objective

The objective of the course is to develop logical ability and basic programming skills of students and to introduce them to implementation, evaluation and analysis of the fundamental structures for representing and manipulating data.

Unit-I

Introduction to Problem Solving: Concept of Programming Languages, Categories of Languages, Flowcharts and Algorithms (Definition, Symbols & Characteristics).

C-Language: History and Evolution, Features, Structure & Life Cycle of a C-Program Data types and sizes, Variables, Constants, Keywords, Storage Classes, Operators (Arithmetic, Logical and Conditional), Expressions, Control statements (if-else, switch, break, continue, go to), Loops (for, while, do-while).

Unit-II

Arrays: Introduction, Types (One and Two dimensional arrays) & Representation, Operations on 1-D and 2-D Arrays.

Functions & Pointers: Types of Functions (built-in and user defined), declaration, definition, and function call, parameter passing and return types, Call by Value and Call by Reference. Introduction to Pointers.

Structures and Union: Declaration, Accessing Structure and Union Elements, difference, Array of Structures, Passing Arrays and Structures to Functions.

Unit III

Introduction to Data Structure: Basic Terminology, Elementary Data Structures, Abstract Data Type, Pointers, Linked List (Singly, Double & Circular), Operations on Linked List (Traversing, Insertion, Deletion etc.), Introduction to Garbage Collection.

Stacks and Queues: Basic Concept, implementation, Applications: Recursion (Fibonacci Series & Factorial), Polish Expressions and their Compilations (Infix, Prefix, Postfix), De-Queues, Priority Queues

Unit IV

Trees: Concept, Binary Trees, Tree Traversal Techniques (Preorder, Post-order, In-order), Complete Binary Trees, Binary Search Tree & Operations on Binary Search Tree (Searching, Insertion & Deletion).

Graphs: Concept, Directed Graphs, Graph Representation (Adjacency Matrix and Linked Representation), Dijkstra's shortest Path Algorithm, Graph Traversal Techniques (Breadth First Search & Depth First Search).

Unit-V

Searching and Sorting: Linear & Binary Search, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Heap Sort and Quick sort.

COURSE OUTCOMES:

CO1. Students will be familiarized with the basic 'C' language syntax and will be able to use the basic constructs (Control statements, Loops) in programming. Will also be able to develop the logic by writing various C programs

CO2. Students will be able to use Arrays and Functions in C programs, like in different operations on Matrices (Addition, Subtraction, Multiplication, and Transpose).To be able to write the programs using pointers.Will be familiarized with Structures and Union.
Students are familiarized with Functions and Pointers in C language and there off their usage in solving the various problems.

CO3. Students are able to know about the various Data Structures like Linked List, Stack, Queue and there implementations by developing the comprehensive 'C' programs for each.

CO4. Students are familiarized with the Non-Linear Data Structures Graph and Tree, their usage and Implementation by developing the comprehensive C programs

CO5. Students will get to know about the various searching and Sorting techniques and 'C 'implementation of all techniques.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

References:

1. Gottfried (2004), Programming with C, Schaum Series,Tata McGraw Hills, New Delhi.
2. Kanetkar Y (2004), Let Us C, BPB, New Delhi .
3. Mulish, C (2004), The Spirit of C, Jaico Publications, New Delhi.
4. Seymour Lipschutz(SCHAUM'S ouTlines), "DATA STRUCTURES", Tata McGraw Hill, 2006.
5. R. Kruse, "Data Structures & Program Design in "C"", Pearson Education, 2004.
6. Prabhakar Gupta,Vineet Agarwal, Manish Varshney, " Data Structure Using 'C', FIREWALL MEDIA ,2007
7. Baluja G. S. , "Data Structures Through C++", DhanpatRai& Co.
8. Tanenbaum, "Data Structures Using "'C" & "C++"", 2nd Ed. PHI Publication, 2005.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (Hrs)	IA	UE	Total Marks	L	T	P	
MIT-142	Internet and web Technologies	3	40	60	100	5	0	0	4

Objective

The objective of the course is to make students knowledgeable about Internet Technologies to give them insight into client side and server side programming to make them proficient in web applications.

Unit I
Introduction

Introduction to Internet, Domain & Host names, Types of Internet Connections (Dial up, DSL, ISDN, Leased Line, Satellites and wireless), ISP, Security issues on the internet.

Web page: static, Dynamic, Active. Web site development Phases: Web Designing, Development and Publishing, URL registration, HTTP, browsers, search engines, Web server, Proxy servers.

Unit II
Hyper Text Markup Language

HTML tags, formatting text, Controlling fonts, Lists, Tables, Adding Pictures, Hyperlinks, Adding audio and video. Setting up frames. Working with Forms and form elements: text boxes, radio buttons, check boxes, dropdown menu, submit button.

Unit III
Cascading Style Sheets

Introduction to Style sheet, types of style sheets - Inline, External, Embedded CSS. CSS Properties: Text formatting properties, CSS Border, margin properties, color properties, Font properties, List properties, Alignment of text, Background images. Use of classes in CSS, Creating CSS, applying CSS to HTML documents, use of & tags.

Unit IV

Scripting Languages

Client Side scripting versus server side scripting. Introduction to **Java script**, variables, operators, conditional statements and loops, functions, events and event handling, Arrays, Properties & Methods of Objects: window, document, Date, Math, Form, String, Validation of text box entries, checkboxes, radio buttons, e-mail address validation, date validation.

Unit V

Introduction to XML

XML: Introduction and features of XML, XML Writing Elements, Attributes, etc. XML with CSS, DSO, XML Namespaces, XML DTD, XML Schemas, Writing Simple Sheets using XSLT, SAX & DOM Parsers.

COURSE OUTCOMES:

CO1. The students will get knowledge about the Internet, internet security issues and website development. The students will get to know about various concepts related to client side and server-side programming to make them proficient in web applications.

CO2. The students will learn how to design various web pages using various html tags and controls.

CO3. The students will learn how to present and style various web pages using cascading style sheets.

CO4. The students will get knowledge about client and server side scripting. The students will learn Java script to design various dynamic web pages.

CO5. The Student will learn various XML elements and XML schemas and write simple sheets using various parsers.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

References:

1. Julie C. Meloni, "HTML, CSS and JavaScript All in One", Sams Teach Yourself
2. Deitel & Deitel, (2005), "*Internet & www How to Program*", *3rd Edition,* PHI.
3. Ivan Bayross, "Internet & Web Technologies".
4. Jamsa Kris, King Konrad, Anderson Andy, (2002), "*HTML & Web design, Tips & Techniques*", TMH.
5. Young Marget Levine, (2004), "The *Complete reference, Internet*". *2nd Edition,* TMH

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-143	Operating System	3	40	60	100	5	0	0	4

Objective

The course aims at introducing students to the fundamental concepts of operating systems. The emphasis is on making students familiar with the principles and processes of operating systems, in context of process management, input/output, memory management and file systems.

Unit-I

Operating System: Introduction, Evolution (Serial processing, Batch Processing, Multiprogramming), Types of OS (Multi-Programming, Time-Sharing, Distributed, and Real-Time Systems), Operating System Structure (Monolithic, Layered, Kernel, Virtual Machine, Client Server Model).

Unit-II

Process Management: Process Concept, Process states, Implementation of process, PCB, Threads, CPU Scheduling, Types of Schedulers, Scheduling Criteria, Scheduling Algorithms (FCFS, SJF, Priority Based, Round Robin, Multilevel Queue).

Unit-III

Inter-process Communication & Synchronization: Race condition, Critical Section Problem, Mutual Exclusion, Synchronization Hardware, Peterson's Solution, Producer -Consumer Problem, Semaphores.
Deadlocks: Model, Prevention, Avoidance, Detection and Recovery.

Unit-IV

Memory Management-I: Basic Hardware, Address binding, Concept of Logical and Physical Addresses, Dynamic loading, Swapping, Single Process Monitor, Multiprogramming with Fixed Partition and Dynamic Partition, Paging (Basic method, Hardware support (TLB)), Segmentation (Basic method, Hardware support).

Unit-V

Memory Management-II: Virtual Memory and its Advantages, Demand Paging (Basic concept), Page Replacement algorithms (FIFO, Optimal Page replacement, Least Recently Used).

Disk management: Concept of Files and Directories, Disk allocation methods (Contiguous, Non-contiguous, Indexed), Disk Scheduling Methods (FCFS, Shortest seek Time first, Scan Scheduling).

COURSE OUTCOMES:

CO1. Student will be able to understand the concepts of Evolution, types and structure of Operating System.

CO2. Student will understand the concepts of Process management in Operating System.

CO3. Student will be able to understand Inter-process Communication & Synchronization& Deadlocks in Operating System.

CO4. Student will be able to understand the memory management concepts like Multiprogramming, Paging, TLB, Segmentation..

CO5. Student will be able to understand the memory management concepts like Virtual Memory Demand Paging, Page Replacement algorithms and Disk management concepts

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Text Books:

1. Siberscatz A & Galvin, P (2004), Operating System Concepts, Willey Pub**.**

References:

1. Milankovic. M (2004), Operating System Concepts & Designs, TMH.
2. Tanenbaum, A. S (2000), Modern Operating System, PHI.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-144	Digital Electronics	3	40	60	100	5	0	0	4

Objective

The course is designed to get the students acquainted with digital electronics and basic number crunching concepts of digital machines.

Unit I

Digital Logic Circuit and Binary codes

Digital and Analog quantities, Number system (Binary, Octal Decimal, Hexadecimal), Number Based Conversions, Binary Arithmetic, Compliments (1's and 2's compliments of binary numbers). Weighted and Non-weighted Codes, BCD Codes, excess-3 Codes, gray codes, ASCII codes, EBCDIC codes.

Unit II

Boolean Algebra and Combinational Logic

Logic Gates Logic Gates (NOT, OR, AND), Universal Gates (NAND,NOR), X-OR,X-NOR, Boolean Algebra an Logic Simplification, Boolean Operation and Expressions, Laws and rules of Boolean algebra, De-Morgan's Theorems, Simplification using Boolean Algebra, The Karnaugh Map. Half Adder, Full Adder, BCD Adder, Basic Binary Decoder,4 bit decoder, BCD to Decimal Decoder, BCD to 7 segment decoder, Decimal to BCD Encoder, Octal to Binary Encoder, Priority Encoder.

Unit III

Sequential Circuits: Introduction, Latches (SR Latch , D Latch) , Flip Flops (RS,T,D, JK). Conversion of Flip-Flops (SR Flip-Flop To JK Flip-Flop, JK Flip-Flop to SR Flip-Flop), Application of Flip-Flops.

Unit IV

Counters: Asynchronous Counters: 2-bit Asynchronous Binary Counter, 3-bit Asynchronous Binary Counter, Asynchronous Decade Counter,4-bit Asynchronous Binary Counter, **Synchronous Counters:** 2-bit Synchronous Binary Counter, 3-bit Synchronous Binary Counter, 4-bit Synchronous Binary Counter, 4-bit Synchronous Decade Counter.

Unit V

Shift Registers and Logic Families

Registers: Introduction, Basic Shift Register functions, Serial IN/ Serial OUT Registers, Parallel IN/ Serial OUT Registers, Parallel IN/ Serial OUT Shift Registers. Parallel IN/ Parallel OUT Shift Registers.

Logic Families: Introduction, Terminology (Threshold Voltage, Propagation Delay, Power Dissipation, Fan-in, Fan-out), Transistor Transistor Logic (TTL), Emitter – Coupled Logic (ECL).

COURSE OUTCOMES:

CO1. Students will be able to understand Number Systems, Computer Airthematic and the Various Coding Schemes.

CO2. Students will be able to understand the Logic Gates, Various Logic Simplification Methods and get familiarized with the combinational Circuits.

CO3. Students will get to know, the working of different kinds of Flip Flops and their Conversions in-between.

CO4. Students will get to understand the Counters (Synchronous and Asynchronous).

CO5. Students will be able to know the shift registers and the Data Movements within and between the Registers besides the various logic Families.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Text Books:

1. Digital Fundamentals, Floyd and jain, first impression 2006, Pearson Education

References :

1. Fundamentals of Digital circuits, Kumar A.Anand, PHI.
2. Digital Design With an Introduction to the Verilog HDL, FIFTH EDITION by M. Morris Mano , Michael D. Ciletti Emeritus , PEARSON.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-171	Lab-1 Data Structure	3	50	50	100	5	0	0	4

COURSE OUTCOMES:

CO1. Students will be familiarized with the basic 'C' language syntax and will be able to use the basic constructs (Control statements, Loops) in programming. Will also be able to develop the logic by writing various C programs.

CO2. Students will be able to use Arrays and Functions in C programs, like in different operations on Matrices (Addition, Subtraction, Multiplication, and Transpose).To be able to write the programs using pointers. Will be familiarized with Structures and Union.

Students are familiarized with Functions and Pointers in C language and there off their usage in solving the various problems.

CO3. Students are able to know about the various Data Structures like Linked List, Stack, Queue and there implementations by developing the comprehensive 'C' programs for each.

CO4. Students are familiarized with the Non-Linear Data Structures Graph and Tree , their usage and Implementation by developing the comprehensive C programs

CO5. Students will get to know about the various searching and Sorting techniques and 'C 'implementation of all techniques.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (Hrs)	IA	UE	Total Marks	L	T	P	
MIT-172	Lab-2: Web Technologies	3	50	50	100	0	0	6	4

COURSE OUTCOMES:

CO1. The students will be able to develop various web pages containing the tags for formatting text, controlling fonts, etc. the students will be able to develop pages containing various ordered and unordered lists, tables, images, hyperlinks, etc.

CO2. The students will get proficient in developing the web pages with audio, video, framesets. The students will get proficient in developing pages containing forms with various elements (text boxes, radio buttons, dropdown menu, buttons, etc.).

CO3. The students will learn how to style the web pages created by using html. The students will get expertize in using various inline, internal and external stylesheets.

CO4. The Students will be able to style the html pages by using various CSS properties like text formatting, border, margin, color, list, background images, etc. the students will learn to use div and span tags to make the web pages more presentable.

CO5. The Students will be able to create various dynamic web pages using JavaScript. The students will get acquainted with the various control structures, operators, functions, etc. used in java script.

CO6. The Students will be able to validate the text box entries, checkboxes, radio buttons, email address and date. The students will get well versed with the use and handling of various possible events while developing the dynamic web pages.

CO7. The students will get well versed with using the XML features, writing elements, attributes, etc. The students will be able to write simple sheets using XSLT, SAX and DOM parsers.

Semester-II

Course Code	Course Title	Credit Value	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MIT-241	Java Programming	4	3	40	60	100
MIT-242	Database Management System	4	3	40	60	100
MIT-243	Data Communication and Computer Networks	4	3	40	60	100
Choice Based Open Electives(Students are required to opt any one of the following courses)						
Math-201	Mathematical Tools in Real World Problems	4	3	40	60	100
Comp-203	Computer Applications & Operations	4	3	40	60	100
Bio-204	Fundamentals of Biotechnology	4	3	40	60	100
Bot-205	Mysteries of Green Plants	4	3	40	60	100
Bot-206	Botany in Rural Developments	4	3	40	60	100
Zol-207	Nutrition, Health & Hygiene	4	3	40	60	100
Arab-208	Fundamentals of Arabic Language	4	3	40	60	100
Eng-209	Applied English	4	3	40	60	100
Edu-210	Higher Education	4	3	40	60	100
Eco-211	Principles of Banking	4	3	40	60	100
HT-212	Basics of Tourism and Travel Agencies	4	3	40	60	100
HT-213	Tourism Resources of J&K	4	3	40	60	100
Ngt-214	Business Communication soft Skills	4	3	40	60	100
Edu-215	Instructional Technology	4	3	40	60	100
Lab Course						
MIT-271	Lab -3: Java Programming	4	3	50	50	100
MIT-272	Lab-4: Pl/SQL	4	3	50	50	100
	Total	**24**		**260**	**340**	**600**

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (Hrs)	IA	UE	Total Marks	L	T	P	
MIT-241	Java programming	3	40	60	100	0	0	6	4

Objective

This course acquaints students with object oriented programming concepts and other advanced features and their implementation in Java language.

Unit-I

Introduction: An overview to Java, Comparison with other languages (C & C++), Java and Internet, Features of Java, Introduction to Java Virtual Machine, Object Oriented Programming Concepts: Abstraction, Encapsulation, Inheritance and Polymorphism.

Data types: Integers, Floating point, Character type and Boolean.

Variables: Assignment, Initialization and Conversions.

Operators: Arithmetic, Assignment, Modulus, Relational, Boolean and Bitwise.

Unit-II

Arrays: Single and Multidimensional.

Control statements: Conditional Statements, Iteration Statements and Jump Statements.

Classes & Methods: Class Fundamentals, Declaring Objects, this keyword, Creating Methods, Constructors, Command Line Arguments & Argument Passing.

Unit-III

Inheritance: Basics of Inheritance, Super Class, Member Access, Creating a Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch & Abstract Class, Static, Super and final Keywords

Packages & Interfaces: Defining and Importing Packages, Understanding Class path, Access Protection, Defining and Implementing Interfaces.

Exception Handling: Fundamentals of Exceptions, Exception Types, Using Try and Catch, Throwing Exceptions, Built-In Exceptions in Java, User Defined Exceptions.

Unit-IV

Multithreaded Programming: Java Thread Model, Creating & Working with Threads, Thread Priorities, Introduction To Synchronization and Dead Locks.

String Handling: String Constructor, String Operations, Character Extraction, String Searching & Comparison, String Buffer Class, String Buffer V/s String Class. **Util Package:** Wrapper classes, Vectors, Date and Time classes.

Unit-V

I/O Streams: Stream Classes, Reading & Writing to Console, Accessing files & Directories, File Input and Output Stream, Byte Array Input & Output Stream.

Applets: Overview, Life cycle of an Applet, HTML tag, Parameter Passing, Applet vs. Applications.

AWT: Introduction, working with awt controls, layout managers.

JDBC: Introduction to JDBA, Connection, Statement, Resultset Classes.

COURSE OUTCOMES:

CO1. The students will get an understanding about Java and various object-oriented programming concepts related to problem-solving.

CO2. The students will learn about the various control structures used in java and various fundamentals of classes, objects, methods, etc.

CO3. The students will get an understanding about various important concepts in Java like inheritance, packages and interfaces. The students will learn to handle exceptions during program execution.

CO4. The Student will be familiarized with concepts and use of Multithreading, synchronization and deadlocks. The students will learn to handle strings and use various in-built java packages.

CO5. The Student will learn how to use and access files and directories using I/O streams. The students will learn the concepts of Applets, various AWT controls and connecting to database using JDBC.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Text Books:

1. Schildt, H (2004), "The Complete Reference Java-2 ", Sixth Edition , TMH.

References:

1. Dietel & Dietel (2006), "Java: How to Program Java 2", Sixth Edition, Pearson Education.
2. Horstmann & Cornell (2006), "Java2 Vol-1 & Vol-2", Seven Indian Reprint, Pearson Education.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-343	Database Management System	3	40	60	100	5	0	0	4

Objective

The aim of the course is to introduce students to the fundamental concepts necessary for designing, using and implementing database systems. It emphasizes relational database modeling & design and the languages and facilities provided by the relational database management systems.

Unit-I

Database System Concepts & Architecture: Concept, Characteristics of database, Database system Vs file system, Introduction to DBMS, Advantages, Disadvantages of DBMS, Database users.

Database System Concept & Architecture: Concept, schemas and instances, DBMS architecture & data independence, Components of DBMS.

Unit-II

Data models: Data modeling using ER-Approach (Concept, ER-Notations, Entities, Entity types, Attributes, Attribute types, Relationships Keys concept).

Conventional Data Models & Systems: Network data model concept, Hierarchical model concept.

Relational Data Model: Concept, Relational model Constraints (Entity Integrity, Referential Integrity, Key Constraints, Domain Constraints), Codd's Rules, Relational Algebra (Fundamental Operations).

Unit-III

SQL: Introduction, Concept, Characteristics of SQL, Advantages of SQL, Data definition in SQL, literals, Operators, Specifying Constraints in SQL, Data manipulation in SQL, Views & Queries, Insert, Update & Delete Operations, Creating users, Grant and revoke object privileges.

Unit-IV

Relational Database Design & Normalization: Concept of Functional dependencies (Fully, partial, Transitive), Normalization of relational database, Normalization, Join dependencies.

Unit-V

Transaction Management & Recovery: Concept, Transaction states, Transaction properties (ACID Test), Serializability , Recoverability. Concurrency Control & Recovery Techniques: Concurrency control Concept, Concurrency control techniques, Locking (concept, types), Time stamp ordering, Granularity of data items, Dead lock & its Resolution.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Course Outcome

CO1: Distinguish database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit. The student shall also be able to define the terminology, features, classifications, and characteristics embodied in database systems.

CO2: Model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model and also demonstrate an understanding of the relational data model anD also Formulate, using relational algebra, solutions to a broad range of query problems.

CO3: Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. The students shall know why normalization and what role it plays in the database design process and also its various normal forms 1NF, 2NF, 3NF, BCNF, and 4NF.

CO4: Determine the Acid properties (Atomicity, Consistency, Isolation and Durability) of a given Transaction and also explore the various locking protocols and database backup and recovery mechanisms so as to implement the same in the real world.

CO5: write various DDL/DML/DCL SQL commands to insert/update/delete data, and query data in a relational DBMS. Students shall solve a broad range of query and data update problems.

Text Books:

1. Elmarsi, Navathe, S B (2004) ,"Fundamentals of database Systems", Pearson Education.
2. Leon(2004), "Database Management Systems", Vikas Publications.
3. Silbebschatz, A. Korth, H,F. Sudarshan ,S (2006) ,"Database System Concepts", TMH .
4. Bayross. I, "Commercial Application Development using Oracle Developer 2000", BPB Pub.

References:

1. Date, C J (2005), "An Introduction to Database Systems", Addison Wesley.
2. Desai, B C (2002), "An introduction to database Systems", Galgotia Publications.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-243	Data Communication and Computer Networks.	3	40	60	100	5	0	0	4

Objective

The main objective of this course is to make student familiar with the basic data communication and Networking Concepts.

UNIT-I

Data Communication: Components Of Data Communication, Data Flow (Simplex, Half duplex and Full Duplex), Transmission impairments (attenuation, Distortion and Noise), Data rate limits (Nyquist bit rate and Shannon capacity), Bit rate and Baud rate, transmission modes (Parallel and serial). Introduction to OSI reference model and TCP/IP protocol suite.

Transmission media: Guided media (Twisted pair cable, co-axial cable, fibre optic cable) **Unguided media:** Radio waves and Microwave.

UNIT-II

Digital Transmission: Digital to Digital Conversion: Line coding schemes (Unipolar, polar and bipolar), analog to Digital Conversion: Pulse Code Modulation (PCM)**.**

Analog Transmission: Digital to Analog Conversion: Amplitude Shift Keying, Frequency shift Keying, Phase Shift keying. Analog to Analog Conversion: Amplitude Modulation, Frequency Modulation, Phase Modulation.

Multiplexing: Frequency Division Multiplexing, Time division Multiplexing and Wavelength Division Multiplexing

UNIT-III

Error Detection: Parity checking, checksum, CRC**.**

Forward Error Correction: Block Parity (LRC, VRC), Hamming code.

Framing: Fixed Size Framing and Variable Size framing.

Reverse Error Correction: Noiseless channel protocols (Simplest Protocol, Stop wait Protocol), Noisy Channel protocols (Stop and Wait ARQ, Go Back N ARQ)

UNIT-IV

Internetworking: Concept of internetworking, Circuit switching, Message switching and Packet switching (Datagram Switching, virtual circuit packet switching).

IP Addressing: Class full IPv4 addressing, Sub netting, IPv4 Datagram format, IPv6 format ,Tunneling.
Routing Protocols: RIP, OSPF, and BGP.
Multicasting Routing Protocols: Uncast, Multicast and Broadcast.

Unit-V
TCP and UDP:-Connectionless versus Connection oriented Service, introduction to UDP (well known ports for UDP, User datagram format) and TCP (Well known ports for TCP, TCP Segment Format, TCP connection establishment Phase).
Concept of Internetworking Devices: - Hub, Repeater, Bridge, Router and Gateway
Firewall: Packet Firewall and Proxy Firewall.

COURSE OUTCOMES:

CO1. Students will be familiarized with the basics of Data communication, the functions of the different layer of the TCP and OSI reference mode. Will be able to know and understand the different Transmission Media.
CO2. Understanding of the Digital and Analog transmission and will be able to understand the concept of Multiplexing.
CO3. Understanding of the existing protocols at Data Link Layer which include Error detection and Correction.
CO4.To have the knowledge of network layer which include internetworking, IP addressing and various routing protocols.
CO5. To have the knowledge of Transport layer and understanding of Firewalls.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Text Books:
1. Behrouz A. Forouzan , "Data communication & Networks" , Fourth Edition 2006, TMH.

References:
1. Tannenbaum, "Computer Networks" , Fourth Edition 2004 PHI.
2. William Stallings," DATA AND COMPUTER COMMUNICATIONS" Eighth Edition , PEARSON.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (Hrs)	IA	UE	Total Marks	L	T	P	
IT-202	Soft skills in Information Technology	3	40	60	100	5	0	0	4

OBJECTIVE: - This course is designed for students with no or little IT knowledge. The basic aim of this course is to acquaint the students with the basic knowledge of Information & Communication technologies. Moreover, the students will also get insight about the role of IT in different fields and emerging trends in Information Technology.

UNIT I: Introduction to Information Technology

Basic concepts of IT: Objectives of Information Technology, Components of Information Technology (Computer Technology, Communication Technology, Telecommunication Technology, Optical Communication, Satellite Communication)

Data Processing: Data & Information, Objectives of Data Processing, Steps in Data Processing, Data Processing Operations

UNIT II: Communication Technologies:

Difference between Wired & Wireless Communication, Various types of Wireless Communication systems (Paging System, Cordless Telephone, Cellular Telephone), Generations of mobile phone technologies (1G, 2G, 3G).

UNIT III: Internet Technologies

Introduction to Internet, Internet Applications, World Wide Web, Web Servers, Web Browsers, Search Engines, E-mails.

HTML: Basic Formatting Tags, Creating Hyperlinks, Tables, and Forms.

UNIT IV: Information Security

Information Security Overview: Types of Attacks: Active & Passive, Goals of Security, Security Threats, Cyber Crime & Cyber Terrorism

Cyber Laws: IT Act 2000, National Cyber Security Policy 2013.

UNIT V: Role & Emerging Trends in IT

Role of IT in Education, Industry, Banking, Public Services, Medicine and Engineering.

Latest IT Trends: - e-commerce, m-Commerce, Geographic Information System (GIS), e-governance, Data & Web Mining.

COURSE OUTCOMES:

CO1. The students will get an insight about the various Internet and Communication Technologies and role of IT in different fields and emerging trends in IT.

CO2. The students will learn about the various number systems (binary, decimal, octal, hexadecimal) and basic concepts of IT regarding data processing.

CO3. The students will learn various communication technologies and generations of mobile phone technologies.

CO4. The Students will be familiarized with various Internet Technologies and taught how to develop various web pages using HTML.

CO5. The Students will learn about various concepts related to Information Security like types of attacks, security threats, Cyber-crime and various cyber laws.

CO6: The students will get the knowledge about the role of IT in various sectors (Education, banking, industry, medicine, and engineering). The students will get to know about latest trends in IT.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

REFERENCES:

- Alexis Leon & Mathews Leon , "Fundamentals of Information Technology", Vikas Publishing House, 2nd Edition.
- Ivan Bayross, "Internet & Web Technologies".
- Behrouz A. Forouzan , "Data communication & Networks" , Fourth Edition 2006, TMH.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (Hrs)	IA	UE	Total Marks	L	T	P	
MIT-271	Lab-3: Java programming	3	50	50	100	0	0	6	4

COURSE OUTCOMES:

CO1. The students will learn how to use various datatypes, how to declare and initialize variables, type conversion, etc. The students will learn the use of various types of operators in Java (Arithmetic, Assignment, Relational, Boolean, Bitwise, etc.).

CO2. The students will get proficient in using single and Multidimensional Arrays, various control structures, etc. The students will be able to define classes, declare objects, using various new keywords and constructors. The students will also learn how to use command-line arguments.

CO3. The students will learn how to use inheritance, creating multi-level hierarchy, dynamic method dispatch, etc. The students will be able to write programs illustrating the use of abstract classes, various keywords,(static, final, super, etc). The students will learn the use of packages and interfaces as well as the tactics of handling exceptions (user-defined and in-built)

CO4. The Students will be able to write programs demonstrating the use of multithreading, synchronization and deadlocks. The students will learn the use of various ways to handle Strings and the usage of Util package in Java.

CO5. The Students will be made to write programs that use the I/O streams like reading and writing to console, accessing files, etc. the students will be able to create applets, use AWT controls and connect to the database using JDBC.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (Hrs)	IA	UE	Total Marks	L	T	P	
MIT-272	Lab-4: Pl/SQL	3	50	50	100	0	0	6	4

CO1: Write various DDL/DML/DCL SQL commands to insert/update/delete data in/from the table(s).

CO2: Write various queries to extract the data from the table(s) based on the problem in hand.

CO3: Implement locking on the databases.

CO4: Write various Pl/ SQL Blocks to work on Functions, Cursors, and Triggers.

Semester-III

Course Code	Course Title	Credit Value	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MIT-341	Dot Net Technologies using C#	4	3	40	60	100
MIT-342	Wireless and Mobile Communication	4	3	40	60	100
MIT-343	Design and Analysis of Algorithms	4	3	40	60	100
Choice based Complimentary Elective Courses(Students are required to opt any one of the following courses)						
MIT-345	Information Security	4	3	40	60	100
MIT-346	Bioinformatics	4	3	40	60	100
MIT-347	Cloud Computing	4	3	40	60	100
MIT-348	Distributed Database Management.	4	3	40	60	100
MIT-349	Web Mining	4	3	40	60	100
MIT-350	Distributed Computing	4	3	40	60	100
Lab Course						
MIT-371	Lab-5: C#	4	3	50	50	100
MIT-372	Lab-6: Algorithm Design Techniques	4	3	50	50	100
Total		24		260	340	600

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-341	.Net Technology using C#	3	40	60	100	5	0	0	4

Objective

The course is designed to introduce students to the concept the .Net framework. The course shall cover Visual Basic .Net as well as ADO .Net. Emphasis of the course is on enhancing programming skills of students for developing projects.

Unit-I

.Net Framework and IDE : Introduction To .Net Framework, .Net Architecture, Advantages of Dot Net Frame Work, Common Language Runtime, MSIL And JIT, Class Library, Integrated Development Environment (IDE): IDE Components, Windows Forms and Basic Controls, Windows Forms And Events, Message Box, Basic Controls like Command Buttons, Text Box, List Box, Radio Buttons, Labels, Link Labels, Combo Box, Building Small Applications.

Unit-II

C# Basics: C# Literals, Variables & Data Types, Operators and Expressions.
Working with Events and Event Driven programming

Conditional Logic: Introduction, Decision Making With If Statement, Simple If Statement, If…Else Statement, Nesting Of If …..Else Statements, Else If Ladder, Switch Statement,? Operator.

Looping Logic: Introduction, The While Statement, The Do Statement, For Statement, For Each Statement, Jumps In Loops.

Branching Logic: Arguments, Call by value, Call by reference, Passing Objects and Lists

Unit-III

Manipulating Strings: Introduction, Creating Strings, String Methods, Inserting Strings Using System, Comparing Strings, Finding Substrings, Mutable Strings, Arrays of Strings.

Managing Errors and Exceptions: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements. Working with Date and Time

Unit-IV

Classes and Objects: Introduction, Inheritance – Single and Multiple, Polymorphism- Function Overloading and Operator Overloading.

Interfaces: Introduction, Defining an Interface, Extending an Interface, Implementing Interfaces, Interfaces and Inheritance, Abstract Class and Interfaces.

Delegates and Events: Introduction, Delegates, Delegate Declaration, Delegate Methods, Delegate Instantiation, Delegate Invocation, Using Delegates.

Unit-V

Data Base Connectivity: Data Access with ADO .Net, Using Databases, Server Explorer, Data Adapter and Datasets, Working with ADO .Net, Architecture of ADO .Net.
Using Data controls: Data Grid, Data Binding, Creating New Data Connection in Code.
Crystal Reports: Creating Crystal Reports, Creating Custom Reports, Report Field Validation &Exporting Reports.

COURSE OUTCOMES:

CO1. The student will get familiar with the basic concept of .Net framework and its components and experience with IDE of Visual Studio. Students able to develop application using c sharp programming language on window form

CO2. The student will learn about the fundamental concepts of C Sharp programming language which included data types, conditional statements, and branching loops.

CO3. Student will be able to learn about the string manipulation techniques and how to manage errors and exception in C#

CO4. Student will be familiarizing with the Object Oriented principle which includes inheritance, encapsulation, interface and polymorphism. Students also get knowledge about delegate and event in C#.

CO5. Student will able to understand how to establish Data Base Connectivity using ADO .Net, Server Explorer, Data Adapter and Datasets, Creating New Data Connection in Code. Crystal Reports: Creating Crystal Reports, Creating Custom Reports, Report Field Validation &Exporting Reports.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Text Books:

1. Platt ,D S (2005), "Introducing Microsoft .Net", Microsoft Press,PHI.
2. Simon et. al(2005) , " C# for Begineers", Wrox Publications.
3. Simon et. al(2005) , "Professional C#", Wrox Publications**.**

References: Schildt , H(2005), "The Complete Reference C #",TMH.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-342	Wireless & Mobile Communication	3	40	60	100	5	0	0	4

Objective

The objective of the course is to make the students acquainted with the technologies involved in wireless communications and make them understand the mobile communication infrastructure and operating environments.

Unit I

Introduction to Wireless Communication: Various types of wireless communication systems (paging system, Cordless telephone systems, Cellular telephone systems); Comparison of common wireless communication systems; Applications of wireless communication; Introduction to various generations of mobile phone technologies and future trends; Concept of Mobile originated & Mobile terminated calls.

Unit II

Introduction to Cellular concept: Cell fundamentals; Frequency reuse; Channel assignment strategies; Handoff strategies (Prioritizing & Practical handoff considerations); Concept of coverage area, Cell splitting and sectoring.

Unit III

Wireless transmission concepts: Concept of signals; Antennas, Types of antennas; Signal propagation (Path-loss of radio signals, Multi-path propagation); Concept of multiplexing, Comparison of FDM, TDM, CDM techniques; Basic Concept of spread spectrum (SS) techniques (Direct sequence and Frequency hopping spread spectrum).

Unit IV

Introduction to IS-95 CDMA: concept of CDMA channels (Forward and Reverse CDMA channels for a cell; Concept of code channels within CDMA channel; Purpose of pilot, Sync, Paging and traffic channels.
General introduction to GPRS, Bluetooth, Infrared technology.

Unit V

Mobile Communication system: Basic GSM architecture; Terminology and interfaces; Components of wireless communication infrastructure (MS, BTS, BSC, MSC) their basic functions and characteristics; Mobility management issues –

initiation of handoffs, types of handoffs, Concept of roaming and Registration; Use of HLR and VLR in mobile networks.

COURSE OUTCOMES:

CO1. Students will be able to explain different wireless technologies, their applications and future trends.

CO2. Students will be able to explain the working of cellular networks, frequency reuse, handoff techniques etc.

CO3. Students will be able to explain the wireless transmission concepts such as antennas, Modulation techniques, and spread spectrum etc.

CO4. Students will be able to understand and explain the CDMA technology concepts.

CO5. Students will be able to understand and explain the GSM technology concepts.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Text Books :

1. Jochen Schiller "Mobile Communication", 2nd Ed., Pearson edition.
2. K. Pahlavan, P. Krishnamurthy "Principles of Wireless Networks", PHI, New Delhi.
3. Theodore S. Rappaport "Wireless Communication Principles & Practice", 2nd Ed. PHI, New Delhi.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-343	Design and Analysis of Algorithm	3	40	60	100	5	0	0	4

The course is designed to acquaint the students about various algorithm design techniques and analyzing their complexities.

Unit-I

Introduction to Algorithms: Algorithm Specifications, Time and Space Complexities, Asymptotic Notations, Inequalities involving such notation, Non-Comparison Sorting Algorithms (Radix sort and Bucket sort).

Unit-II

Algorithm Analysis and Design Technique: Analysis framework, Efficiency of algorithms, **Greedy Techniques**: Prim's algorithm, Krushkal's algorithm, Dijkstra's method, Huffman trees.

Divide and Conquer: Quick Sort, Merge Sort, Strassen's Matrix multiplication.

Unit-III

Recursive Algorithms: Analysis of recursive and non- recursive algorithm,

Search Techniques: Depth-First Search and Breadth-First Search Algorithms, Topological sorting.

Advanced Data Structures: Hash Table and Hash function, Open addressing and separate chaining.

Unit-IV

Dynamic programming: All Pair Shortest Paths (Floyd-Warshal Algorithm), Optional Binary Search trees, 0/1 Knapsack Problems.

Back-tracking: 8- Queen's Problem, Graph Coloring and Sum Of Subsets Problems.

Unit-V

Horner's rule and Problem Reduction, Branch and Bound problems, Nondeterministic Algorithms, Classes NP-hard and NP-Complete, Approximation Algorithms for NP hard problems. PRAM model and Algorithms.

COURSE OUTCOMES:

CO1. For a given algorithm student will able to analyze the algorithms to determine the computational complexity and justify the correctness.

CO2. For a given sorting techniques (Count, Radix, Bucket, Merge, Quick) student will able to write algorithm and calculate time complexity.

CO3. Student will be able to solve different kind problems using Divide and Conquer algorithm, Greedy approaches and Dynamic programming.

CO4. Student will be familiarize with Advance Data Structures such as Hashing and different Hashing techniques.

CO5. Student will able to understand, distinguish and solve P, NP and NP-complete problems

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Textbooks:

1. Anany,Levitin, "Introduction to the Design & Analysis of Algorithm", 2nd Edition, Pearson Education,2007.

References:

1. Leiserso, Cormen, Rivert, "Introduction to Algorithms, , New Delhi, 2nd Edition, 2005, PHI Publication
2. Brately Brassard , "Fundamentals of Algorithms", New Delhi, 1996, PHI Publication
3. Michael T. Goodrich, Roberto Tamassia, "Algorithm Design", New Delhi, 2004. Wiley Publication

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-345	Information Security	3	40	60	100	5	0	0	4

Objectives: Upon completion of this course, students will have gained knowledge of information security concepts and understanding of Information Security principles and approaches.

Unit I: Introduction to Security attacks, services And mechanisms, Introduction to cryptology. Conventional Encryption model, classical encryption techniquessubstitution ciphers & transposition ciphers, cryptanalysis, stereography, stream & block ciphers.

Unit II: Public Key Encryption, Digital Signatures - Number Theory, Prime Numbers Format"s and Euler"s Public Key Cryptography and RSA: Principles of Public Key Cryptosystems, The RSA Algorithms, Key Management, Diffie Hellman Key Exchange.

Unit III: Authentication Protocols - Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithms, Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standards.

Unit IV: Network Security - Authentication Applications: Kerberos, X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload. Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

Unit V: System Security- Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and its Design Principles, Virtual Private

COURSE OUTCOMES:

CO1. After study student will learn about Security attacks, services And mechanisms, Introduction to cryptology. Conventional Encryption model, classical encryption techniques substitution ciphers.

CO2. Student will be familiar with information security techniques and algorithm Public Key Encryption, Public Key Cryptography and RSA: Principles of Public Key Cryptosystems, The RSA Algorithms, Key Management, Diffie Hellman Key Exchange.

CO3. Student will be able to learn about Authentication Protocols which include Authentication Requirements, Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithms, Digital Signatures, Authentication Protocols, And Digital Signature Standards.

CO4. Student will be able to learn about Network Security Authentication Applications: which include Kerberos, X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy. Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction

CO5. Student will able to understand the fundamental concept of System Security- Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and its Design Principles, Virtual Private Networks

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Textbooks:

2. Anany,Levitin, "Introduction to the Design & Analysis of Algorithm", 2nd Edition, Pearson Education,2007.

References:

4. Leiserso, Cormen, Rivert, "Introduction to Algorithms, , New Delhi, 2nd Edition, 2005, PHI Publication
5. Brately Brassard , "Fundamentals of Algorithms", New Delhi, 1996, PHI Publication
6. Michael T. Goodrich, Roberto Tamassia, "Algorithm Design", New Delhi, 2004. Wiley Publication

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-346	Bioinformatics	3	40	60	100	5	0	0	4

Objective:

The course is designed to acquaint the students with the basics of Bioinformatics and its Applications and Tools.

Unit-I

Introduction: Aim and branches of Bioinformatics, Applications of Bioinformatics.

Basic bimolecular concepts: Proteins and amino acids, DNA & RNA, Sequence, structure and function. Forms of biological information,

Types of Nucleotide Sequence: Genomic DNA, Complementary DNA (cDNA), Recombinant DNA (rDNA), Expressed sequence tags (ESTs), Genomic survey sequences (GSSs). DNA sequencing methods: Basic and Automated DNA sequencing, DNA sequencing by capillary array and electrophoresis, Gene expression data.

Unit-II

Bioinformatics Resources: NCBI, EBI, ExPASy, RCSB, DDBJ:

The knowledge of databases and bioinformatics tools available at these resources, organization of databases: data contents, purpose and utility.

Open access bibliographic resources and literature databases: PubMed, BioMed Central, Public Library of Sciences (PloS), CiteXplore.

Unit-III

Sequence databases: Nucleic acid sequence databases: GenBank,EMBL, DDBJ; Protein sequence databases: Uniprot-KB:SWISS-PROT, TrEMBL, UniParc; Structure Databases: PDB,NDB, PubChem, ChemBank.

Sequence file formats: Various file formats for bio-molecular sequences: GenBank, FASTA, GCG,MSF etc.

Protein and nucleic acid properties: Proteomics tools at the ExPASy server, GCG utilities and EMBOSS, Computation of various parameters.

Unit-IV

Sequence Analysis: Basic concepts of sequence similarity, identity and homology, definitions of homologues, orthologues, paralogues and xenologues.

Scoring matrices: basic concept of a scoring matrix, Matrices for nucleic acid and proteins sequences, PAM and BLOSUM series, matrix derivation methods and principles.

Unit-V

Sequence alignment: Measurement of sequence similarity; Similarity and homology.

Pairwise sequence alignment: Basic concepts of sequence alignment, Needleman and Wunsch, Smith and Waterman algorithms for pairwise alignments, gap penalties, use of pairwise alignments for analysis of Nucleic acid and protein sequences and interpretation of results.

COURSE OUTCOMES:

CO1. Student will learn the Aim and branches of Bioinformatics basic bimolecular concepts: Proteins and amino acids, DNA & RNA, Sequence, structure and function. Forms of biological information, Types of Nucleotide Sequence Gene expression data.

CO2. Student will get the knowledge about Sequence databases Nucleic acid sequence databases: GenBank,EMBL, DDBJ Protein sequence databases: Uniprot-KB:SWISS-PROT, TrEMBL, UniParc; Structure Databases: PDB,NDB, PubChem, ChemBank. Sequence file formats.

CO3. Student will able to understand the fundamental concept of Sequence Analysis Basic concepts of sequence similarity, identity and homology, definitions of homologues, orthologues, paralogues and xenologues. Scoring matrices.

CO4. Student will able to understand the fundamental concept of Sequence alignment: Measurement of sequence similarity; Similarity and homology. Pairwise sequence alignment.

CO5. The student will acquaint the basic Bioinformatics Resources: NCBI, EBI, ExPASy, RCSB, DDBJ: The knowledge of databases and bioinformatics tools available at these resources, organization of databases.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Text Books:

1.Bioinformatics: Sequence and Genome Analysis by Mount D.,
Cold Spring Harbor Laboratory Press, New York.2004
2.Bioinformatics-a Practical Guide to the Analysis of Genes and Proteins by Baxevanis, A.D. and Francis Ouellellette, B.F.,
Wiley India Pvt Ltd.2009

Reference Book:

1.Introduction to Bioinformatics by Teresa K. Attwood, David J.Parry-Smith, Pearson Education.1999
2.Bioinformatics for Dummies by Jean-michel Claverie CedricNotredame. Publisher:Dummies

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-347	Cloud Computing	3	40	60	100	5	0	0	4

Objective:
This course gives an introduction to cloud computing and its techniques, issues, and its services that will lead to design and development of a simple cloud service.

UNIT I - CLOUD INTRODUCTION
Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus – Open Nebula, CloudSim.

UNIT II - CLOUD SERVICES AND FILE SYSTEM
Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT III - COLLABORATING WITH CLOUD
Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing ,Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis.

UNIT IV - VIRTUALIZATION FOR CLOUD
Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT V - SECURITY, STANDARDS, AND APPLICATIONS
Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging –

Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

COURSE OUTCOMES:

CO1. Student will be able to know the Overview of Existing Hosting Platforms, Grid Computing, Utility Computing and Autonomic Computing.

CO2. Student will be introduced to Cloud Computing.

CO3. Student will be able to know the Classification of Cloud Implementations: Iaas, Paas and Saas.

CO4. Student will be familiarize with Cloud Environment like Windows Azure Platform

CO5. Student will be familiarize with Cloud Environment like Microsoft Office Live - SaaS, LiveMesh.com, Google Apps

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

TEXT BOOKS

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz "*Cloud Computing for Dummies"* (Wiley India Edition),2010 (UNIT-I)
2. John Rittinghouse & James Ransome, "*Cloud Computing Implementation Management and Strategy"*, CRC Press, 2010.(UNIT-II)
3. Antohy T Velte ,Cloud Computing : "*A Practical Approach*", McGraw Hill,2009(UNIT-II- 3 ,11)
4. Michael Miller, Cloud Computing: "*Web-Based Applications That Change the Way You Work and Collaborate Online"*, Que Publishing, August 2008.(UNITIII)
5. James E Smith, Ravi Nair, "*Virtual Machines*", Morgan Kaufmann Publishers, 2006.(UNIT-IV)
6. http://cloud-standards.org/wiki/index.php?title=Main_Page (UNIT - V)

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-348	Distributed Database Management.	3	40	60	100	5	0	0	4

Objectives

The aim of the course is to introduce students to the fundamental concepts necessary for designing, using and implementing distributed database systems. It emphasizes facilities provided by the distributed database management systems.

Unit-I

Introductory concepts and design of Distributed Database Systems (DDBMS):
Features of Distributed versus Centralized Databases, Principles Of Distributed Databases: Levels Of Distribution Transparency, Reference Architecture for Distributed Databases(Architectures for DDBMS e.g. cluster, federated, parallel databases and client server architecture.), Data Fragmentation, Replication, and allocation techniques for DDBMS, Integrity Constraints in Distributed Databases. Methods for designing and implementing DDBMS e.g. designing a distributed relational database.

Unit-II

Distributed Query Processing and Optimization
Objectives of query processing, Characterization of query processors, Layers of query processing, Query decomposition, Localization of distributed data, Optimizing Distributed Queries, Factors governing query optimization, Centralized, query optimization, Ordering of fragment queries, Distributed query optimization algorithms.

Unit-III

Transaction Management
The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions.

Unit-IV

Concurrency Control

Foundation of Distributed Concurrency Control, Distributed Deadlocks, Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control. Reliability: Basic Concepts, Non blocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration.

Unit-V

Distributed Object/component-based DBMS

Object model features, Fundamental object management issues, DOM architectures, Object caching, Object clustering, Object migration, Distributed object base systems Query Processing In Distributed Object base Systems Problems in accessing distributed objects, Distributed object assembly problem, Strategies for distributed object assembly , Object Orientation And Interoperability Object Management Architecture CORBA and Database Interoperability Distributed Component Model COM/OLE and Database Interoperability.

COURSE OUTCOMES:

CO1. The students will get an insight about the various security principles and issues in the computer networks. The students will get the knowledge about various types of attacks that are possible in the world of Internet.

CO2. The students will learn various encryption and decryption techniques for ensuring the data security.

CO3. The students will learn about various Asymmetric key cryptographic techniques, knapsack algorithms and various strategies to manage the public and private keys.

CO4. The students will get familiar with basic concepts about incorporating Internet Security via various mechanisms and protocols like SSL, TLS, etc. The students will learn how to ensure email security by PGP and various other similar protocols.

CO5. Student will able to understand various user authentication mechanisms (biometric, certificate-based, etc) and will be able to learn about various other Network security mechanisms.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

References:

1. Distributed Database Principles & Systems, Stefano Ceri, Giuseppe Pelagatti - McGraw-Hill

2. Principles of Distributed Database Systems, M.Tamer Ozsu, Patrick Valduriez – Pearson Education.

3. Distributed Object Management, M.T. Özsu, U. Dayal and P. Valduriez - Morgan- Kaufmann 4. Modern Database Systems - The Object Model, Interoperability and Beyond, W. Kim -.ACM Press

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-349	Web Mining	3	40	60	100	5	0	0	4

Objective:

Web Mining is moving the www toward a more useful environment in which users can quickly and easily find the information they need. Web mining is a multidisciplinary field, drawing on such areas as artificial intelligence, databases, data mining, data warehousing, data visualization, information retrieval, machine learning, markup languages, pattern recognition, statistics, and Web technology. This course aims at providing guidance from an information search perspective, focusing on issues relating to the efficiency, feasibility, scalability and usability of searching techniques for Web mining along with future directions.

Unit I

Introduction: Web-mining, Web Content Mining, Web Structure Mining, and Web Usage Mining. Practical web mining applications overview.

Unit II

Web Content Mining: document indexing and retrieval in the web environment - Boolean and vector retrieval models, latent semantic indexing (LSI), results ordering, meta-search. Web Content Mining: web documents categorization and clustering .

Unit III

Natural Language Processing methods for web information retrieval: lemmatization, part-of-speech tagging, disambiguation, shallow syntactic parsing etc.

Web Structure Mining: primary web browsing (crawling, spidering), link topology analysis, PageRank, HITS methods

Unit IV

Global analysis of the Web; social networks analysis Web Usage Mining: mining for user behaviour on the web, internet marketing. Information Extraction as a specific type of web content mining: wrapper-based vs. token activated extraction.

Unit V

Web Mining and its relation to the Semantic Web: automatic semantic annotation, ontology learning, Semantic Web search. Web information integration, mapping schemas usage , web spam analysis

COURSE OUTCOMES:

CO1. Student will able to understand the fundamental concept of Web-mining, Web Content Mining, Web Structure Mining, and Web Usage Mining. Practical web mining applications overview.

CO2. Student will be able to get knowledge about Web Content Mining document indexing and retrieval in the web environment - Boolean and vector retrieval models, latent semantic indexing, results ordering, meta-search. Web Content Mining: web documents categorization and clustering.

CO3. Provide information to students about Natural Language Processing methods for web information retrieval: lemmatization, part-of-speech tagging, disambiguation, Web Structure Mining.

CO4. . Student will be able to understand the concepts of analysis of the Web social networks analysis Web Usage Mining. Information Extraction as a specific type of web content mining.

CO5. Provide information about Web Mining and its relation to the Semantic Web. Web information integration, mapping schemas usage , web spam analysis

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 very short answer type questions eliciting answers not exceeding 20 words / multiple choices / fill in the blanks, each carrying 1 mark equally distributed from all units. The candidate will be asked to answer all the questions. **Section B** will contain two (02) questions from each unit with internal choice, and the candidates will be required to answer one from each unit. Each question of this section will carry 10 marks.

Textbooks:

1. George Chang, Marcus J. Healy, James A. M. McHugh, Jason T.L. Wang, " Mining the World Wide Web: An Information Search Approach", Kulwer Academic Publishers

References:

1. Soumen Chakrabarti, " Mining the Web: Discovering Knowledge from Hypertext Data", Morgan Kufman Publishers

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-350	Distributed Computing	3	40	60	100	5	0	0	4

Objective:

The course is designed to introduce students to the concepts of parallel computing and distributed system framework.

Unit I

Introduction: Need for high speed computing, Need for parallel computers, features of parallel computers, Granularity in Parallel programs, Speedup and performance measures: Amdahl's law.

Unit II

Parallel solution: Solving Problems in Parallel, Temporal parallelism, Data Parallelism, comparison of Temporal and data parallelism, Data parallel processing with specialized processors, Intertask dependencies.

Unit III

Structure of Parallel computers: Pipelined parallel computers, Array processors, A generalized structure of Parallel computer, Shared memory multiprocessors, Message Passing Multicomputers, Multilink multidimensional computing system.

Unit IV

Distributed computing: Definition, goals (transparency, openness, scalability), Software concepts in Distributed computing (distributed operating systems, network operating systems, middleware), introduction to replication (reasons for replication, object replication, replication as scaling technique).

Unit V

Communication: Remote Procedure call (Basic RPC Operation, Parameter passing), Remote Object Invocation (Distributed Objects, Binding a client to an object, Parameter passing), Message Oriented Transient communication (overview of Berkeley sockets and Message Passing Interface(MPI))

COURSE OUTCOMES:

CO1. Student will be able know about the basics of Parallel Computers.

CO2. Student will be able to know about parallel solutions like Problems in Parallel, Temporal parallelism, Data Parallelism.

CO3. Student will be able to know about structure of parallel computers.

CO4. Student will be familiarize with Distributed computing goals like transparency, openness, scalability and Software concepts in Distributed computing.

CO5. Student will able to understand, communication in distributed computing like Remote procedure call and Message passing interface.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. Section B will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Text Books:

Andrew S. Tannenbaum & Maarten Van Steen, "Distributed systems, Principles & paradigms", Pearson Education.

References:

V Rajaraman, " Elements of Parallel Computing", PHI.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-371	Lab-5: C#	3	50	50	100	5	0	0	4

COURSE OUTCOMES:

CO1. Create windows application in C# to enter the marks of 4 subjects of a student and calculate the sum and average of the marks
CO2. Create windows application to show the use of check boxes & radio buttons.
CO3. Write a windows application in C# to define a new class in its own file and create its objects.
CO4. Create C sharp program that takes user-id and password as input and after three wrong attempt user will be rejected.
CO5. Create windows application in C# to perform and display the string manipulations using different string methods.
CO6. Create a windows application in C# to demonstrate function overloading and Operator overloading.
CO7. Create a windows application in C# to illustrate the traffic control signal system
CO8. Consider Database STUDENT consisting of following tables: TB1_Course (CourseID: int, CourseName: string) TB2_Student (USN: string, StudName: string, Address: string, CourseID: int, YrOfAdmsn: int) Develop windows application using C#.NET having following options:
Submit new course details.
Submit new student details.
Display the details of students (in a Grid) who belong to a particular course.
Display the details the students who have taken admission in a particular year.
CO9. Write a windows application in C# to create crystal report of above program.

Course Code	Title	Scheme of Examination				Hrs/Week			Credits
		Duration (hrs)	IA	UE	Total Marks	L	T	P	
MIT-372	Lab-6: Algorithm Design Techniques	3	50	50	100	5	0	0	4

COURSE OUTCOMES:

CO1. For a given algorithm student will able to analyze the algorithms to determine the computational complexity and justify the correctness.

CO2. For a given sorting techniques (Count, Radix, Bucket, Merge, Quick) student will able to write algorithm and calculate time complexity.

CO3. Student will be able to solve different kind problems using Divide and Conquer algorithm, Greedy approaches and Dynamic programming.

CO4. Student will be familiarize with Advance Data Structures such as Hashing and different Hashing techniques.

CO5. Student will able to understand, distinguish and solve P, NP and NP-complete problems

Semester-IV

Course Code	Course Title	Credits	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MIT-441	Project	24	-----	200	400	600

The Components and bifurcation of marks of the course code MIT-441 in Semester IV shall be as follows:

Components	IA	UE
Project Work	-	100
Presentation	100	150
Viva Voce	100	150
Total	200	400

IA- Internal Assessment
UE- University Examination