COURSE STRUCTURE & SYLLABUS

M.Sc. INFORMATION TECHNOLOGY
(M.Sc.-IT)

(for the years 2020, 2021 & 2022)

DEPARTMENT OF INFORMATION TECHNOLOGY
BABA GHULAM SHAH BADSHAH UNIVERSITY
RAJOURI, JAMMU & KASHMIR, INDIA-185234

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

Semester-I

Course Code	Course Title	Credit Value	Scheme of Examination			
			Duration (Hours)	Marks		
				IA	UE	Total
MIT-151	Programming & Problem Solving Using C	4	3	40	60	100
MIT-152	Operating Systems	4	3	40	60	100
MIT-153	Discrete Mathematics	4	3	40	60	100
MIT-154	Digital Logic and Computer Design	4	3	40	60	100
Lab Course(s)						
MIT-181	Lab-1: C Programming	4	3	50	50	100
MIT-182	Lab-2: PC Packages	4	3	50	50	100
Total		**24**	**-**	**260**	**340**	**600**

IA: **Internal Assessment**

UE: University Examination

Course Code: MIT-151 **Maximum Marks:** 100
Course Title: Programming & Problem Solving Using C **University Examination:** 60
L-T-P: 3-1-0 **Internal Assessment:** 40
Credits: 4 **Duration of Examination:** 3 Hours

Objective

This course is designed to enhance student's analyzing and problem solving skills and to provide in-depth knowledge of C language. Students will be able to develop logic which will help them to create programs, and applications in C. By learning the basic programming constructs they can easily switch over to any other language in future.

Unit-I

Introduction to Problem Solving: Introduction to Programming, Concept of Programming Languages, Categories of Programming Languages. Introduction to Algorithms and Flowcharts, Characteristics of Algorithms, Algorithm Design Tools: Pseudo Code and Flowchart.
Introduction to C-Language: A brief history of C, Features, Structure & Life Cycle of a C-Program, C Tokens, Character Set in C, Keywords, Identifiers, Basic Data Types, Variables, Constants, Input/Output Statements in C (Streams, Formatting Input/Output).

Unit-II

Operators in C: Arithmetic Operators, Relational Operators, Equality Operators, Logical Operators, Unary Operators, Conditional Operators, Bitwise Operators, Assignment Operators, Comma Operator, Sizeof Operator.
Decision Control and Looping Statements: Introduction, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statements, goto Statement.
Functions: Introduction, Function Declaration/Function Prototype, Function Definition, Function call, Return Statement, Passing Parameters to Functions (Call by Value, Call by Reference), Category of functions, Scope of Variables (Block Scope, Function Scope, Program Scope), Storage Classes, Recursive Functions.

Unit-III

Arrays: Introduction, Declaration of Arrays, Accessing the Elements of an Array, Storing Values in Arrays. Operations on Arrays: Traversal, Insertion, Search, Deletion. Two-Dimensional Arrays: Declaring Two-Dimensional Arrays, Initializing Two-Dimensional Arrays, Accessing the Elements of Two-Dimensional Arrays, Operations on Two-Dimensional Arrays (Sum, Difference, Multiplication and Transpose), Sparse Matrices.
Strings: Reading Strings, Writing Strings, Sprintf() and Sscanf() Function. String Taxonomy (Fixed Length, Variable Length, Length Controlled and Delimited Strings). String Manipulation Functions: Strcat, Strchr, Strcmp, Strcpy, and Strleng. Array of Strings.

Unit-IV

Pointers: Introduction, Declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Null Pointers, Passing Arguments to Function Using Pointers.
Pointers and Arrays: Passing an Array to a Function, Array of Pointers.
Function Pointers: Initializing a Function Pointer, Calling a Function Using a Function Pointer, Dynamic Memory Allocation in C programs, Drawbacks of Pointers.

Unit-V

Structure: Declaration, Initialization, Accessing the Members of a Structure, Copying and

Comparing Structures, Nested Structures, Arrays of Structures. Structures and Functions: Passing Individual Members.
Unions: Declaration, Accessing a Member of a Union, Initializing Unions, Arrays of Union variables.
Files: Introduction to Files: Streams in C, Buffer Associated with File Stream, Types of Files.
Using Files in C: Declaring a File Pointer Variable, Opening a File, Closing a File Using fclose().
File Read Data from Files: fscanf(), fgets(), fgetc(), fread().
Writing data to Files: fprintf(), fputs (), fputc (), fwrite ().

References:

1. E. Balagurusamy, *Programming in ANSI C*, 7th edition, Mc Graw Hill.
2. Yashwant Kanetkar , *Let Us C*, 15th edition, BPB New Delhi .
3. H. Mullish and H L Cooper, *The Spirit of C*, Jaico Publications, New Delhi.
4. B. W. Keringhan & D.M Ritche, *C Programming language*, PHI New Delhi.
5. H. Schildt, *The Complete Reference in C*, Mc Graw Hill.
6. S.K. Srivastava and Deepali Srivastava, *C in Depth*, BPB, New Delhi.
7. Byron. S Gottfried, *Programming with C*, 4th edition, Schaum Series Mc Graw Hill.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-152
Course Title: Operating Systems
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

This 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 and 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).

References:

1. Avi Silberschatz, Peter Baer Galvin and Greg Gagne, *Operating System Concepts*, 19th Edition, John Wiley & Sons.
2. Milan Milenkovic, *Operating System Concepts & Designs*, 2nd Edition, Mc Graw Hill.
3. A. S. Tanenbaum, *Modern Operating Systems*, 4th Edition, Pearson.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-153
Course Title: Discrete Mathematics
L-T-P: 3-1-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective
Upon completion of this course, students will have gained knowledge of important basics of discrete mathematics, having understanding of sets, relations, logic, matrices and graphs.

Unit-I
Set Theory: Sets and Elements, Universal Set and Empty Set, Subsets, Venn Diagram, Sets Operations, Algebra of Sets and Duality, Ordered Sets, Cartesian Products of Sets, Finite and Infinite Sets, Classes of Sets, Power Sets, Partitions.

Unit-II
Relations: Introduction, Products Sets, Relations, Composition of Relations, Types of Relations, Equivalence Relations, Partial Ordering Relations, Functions, One to One, Onto, and Invertible Functions, Mathematical Functions, Exponential Functions, Logarithmic Function, Cardinality.

Unit-III
Logic and Propositional Calculus: Introduction, Proposition and Compound Propositions, Basic Logic Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Algebra of Propositions.

Unit-IV
Matrices and Counting: Vectors, Matrices, Types of Matrices, Inverses, Determinants, Basic Counting Principal, Binomial Coefficients, Permutations, Combinations, Pigeonhole Principle, Ordered and UnOrdered Partitions.

Unit-V
Graph and Lattices: Graphs and Multigraphs, Traversable Multigraphs, Paths, Complete, Regular and Bipartite Graphs, Tree Graphs, Planar Graphs, Ordered Sets, Hasse Diagrams of Partial Ordered Sets, Supremum and Infimum, Lattices, Bounded Lattices, Distributive Lattices, Complements and Complemented Lattices.

References:

1. Seymour Lipschutz and Marc Lipson, *Discrete Mathematics*, 2nd Edition, Tata McGraw Hill.
2. Babu Ram, *Discrete Mathematics*, 3rd Edition, Pearson.

Note for Paper Setting:
The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-154
Course Title: Digital Logic and Design
L-T-P: 3-1-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

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

Unit-I

Number Systems: Binary, Octal, Decimal, Hexadecimal, Number Based Conversions, Binary Arithmetic, 1's and 2's Compliment of Binary Numbers. Binary Codes: Excess-3 Code, Gray Code, ASCII Code, BCD Code. BCD Addition.
Logic Gates: NOT, OR, AND, Exclusive-OR, Universal Gates (NAND, NOR).

Unit-II

Boolean Algebra: Logic Simplification, Laws and Rules of Boolean Algebra, De-Morgan's Theorems, Sum of Product and Product of Sum Form, Standard Sum of Product and Product of Sum Forms, Minterms and Maxterms, Simplification of Boolean Expressions.
Karnaugh Map and Tabular Simplification: Karnaugh Map, Plotting a Karnaugh Map, Representing Standard Sum of Product and Product of Sum Forms on Karnaugh Map, Simplification of Sum of Product Expressions, Don't Care Condition, Simplification of POS Expressions, Quine-McClusky Method.

Unit-III

Combinational Circuits: Half Adder, Full Adder, Basic Binary Decoder, 4-bit Decoder, BCD to Decimal Decoder, Decimal to BCD Encoder, Multiplexer (4x1 and 8x1), Demutiplexer (1x4 and 1x8).
Sequential Circuits: Introduction, Flip Flops: RS Flip Flop, T Flip Flop, D Flip Flop, JK Flip Flop. Conversion of RS Flip-Flop to JK Flip-Flop.

Unit-IV

Introduction to Counters, Types of Counters-Asynchronous and Synchronous 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

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).

References:

1. Floyd and Jain, *Digital Fundamentals*, 10th Edition, Pearson Education.
2. Kumar A. Anand, *Fundamentals of Digital Circuits*, 3rd edition, PHI.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

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Semester-II

Course Code	Course Title	Credit Value	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MIT-251	Data Structures	4	3	40	60	100
MIT-252	Object Oriented Programming with Java	4	3	40	60	100
MIT-253	Data Communication and Computer Networks	4	3	40	60	100
One course from the list of "*Choice Based Open Elective*" courses offered by other departments.		4	3	40	60	100
Lab Course(s)						
MIT-281	Lab-3: Data Structures	4	3	50	50	100
MIT-282	Lab-4: Java Programming	4	3	50	50	100
Choice Based Open Elective (*Offered by The Department of Information Technology for 2nd Semester students of other Departments*)						
MIT-232	IT Skills	4	3	40	60	100
Total		**24**	**-**	**260**	**340**	**600**

IA: **Internal Assessment**

UE: University Examination

Course Code: MIT-251
Course Title: Data Structures
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

The objective of this course is to introduce implementation, evaluation and analysis of the fundamental structures for representing and manipulating data.

Unit-I

Introduction, Concept of Linear and Non-Linear Data Structures, Basic Terminology, Elementary Data Structures, Operations on Data Structures, Abstract Data Type, Arrays, Array Types, Representation of Arrays, Operations on Arrays, Sparse Arrays, Pointers.

Unit-II

Linked List, Singly, Double and Circular Linked List, Operations on Linked List (Traversing, Insertion, Deletion etc.), Complexity of Algorithms, Asymptotic Notations, Introduction to Garbage Collection.

Unit-III

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

Unit-IV

Concept of Trees, Binary Trees, Tree Traversal Techniques (Preorder, Postorder, Inorder), Complete Binary Trees, Binary Search Tree & Operations on Binary Search Tree (Searching, Insertion & Deletion), Height Balance and Concept of AVL Trees and purpose of B-Trees.

Unit-V

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).
Searching and Sorting: Linear & Binary Search, Merge Sort, Heap Sort, Quick sort.

References:

1. Seymour Lipschutz (Schaum's Outlines), *Data Structures with C*, 1st Edition, McGraw Hill.
2. Reema Thareja, Data *Structures Using C*, 2nd edition, Oxford.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-252 **Maximum Marks:** 100
Course Title: Object Oriented Programming with Java **University Examination:** 60
L-T-P: 4-0-0 **Internal Assessment:** 40
Credits: 4 **Duration of Examination:** 3 Hours

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 of Java, Comparison with other languages (C & C++), Features of Java, Introduction to Java Virtual Machine, Java Magic: Byte Code, 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, and 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
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 Lock. 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.

References:

1. H. Schildt (2004), *The Complete Reference Java-2*, 6th edition, TMH.
2. Dietel & Dietel (2006), *Java: How to Program Java 2*, 6th edition, Pearson Education.
3. Horstmann & Cornell (2006), *Java2 Vol-1 & Vol-2*, 7th Indian Reprint, Pearson Education.
4. E. Balagurusamy, *Programming with JAVA*, 4th, Tata McGraw Hill.
5. Steven Holzner, *Java2 Black Book*, 5th edition, Dreamtech Press.
6. George Reese, *Database Programming with JDBC and Java*, 2nd Edition, O'Reilly.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-253
Course Title: Data Communication and Computer Networks
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

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 0f 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. Guided Media: Twisted Pair Cable, Co-Axial Cable, Fibre Optic Cable.

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, 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 and Wait Protocol), Noisy Channel Protocols (Stop and Wait ARQ, Go Back N ARQ)
Media Access: Pure Aloha Random Access Protocol.

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.

References:

1. Behrouz A. Forouzan , *Data communication & Networks* , 4th Edition 2006, TMH.
2. Tannenbaum , *Computer Networks*, 4th Edition 2004 PHI.

3. William Stallings, *Data and Computer Communications*, 8th Edition , PEARSON.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Choice Based Open Electives

Course Code: MIT-232
Course Title: IT Skills
L-T-P: 3-1-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

The course is designed to aim at imparting a basic level appreciation programme for first semester students. After completing the course the incumbent is able to the use the computer for basic purposes of preparing his personnel/business letters, viewing information on Internet (the web), sending mails, using internet banking services etc. The module on financial literacy will enable the individuals to understand the various financial services and be aware of the various schemes of Government of India. The emphasis shall be on the use of open source software for all practical purposes and extensive use of internet and online resources for studying and practice purposes.

Unit-I

Knowing Computer: What is Computer, Basic Applications of Computer, Components of Computer System, Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other Input/Output Devices, Computer Memory, Concepts of Hardware and Software, Concept of Computing, Data and Information, Applications of IECT, Connecting Keyboard, Mouse, Monitor and Printer to CPU and Checking Power Supply.

Unit-II

Understanding Word Processing: Word Processing Basics, Opening and Closing of Documents, Text Creation and Manipulation, Formatting of Text, Table Handling, Spell Check, Language Setting and Thesaurus, Printing of Word Document.
Using Spread Sheet: Basics of Spreadsheet, Manipulation of Cells, Formulas and Functions, Editing of Spread Sheet, Printing of Spread Sheet.

Unit-III

Introduction To Internet, WWW and Web Browsers: Basic of Computer Networks, LAN, WAN, Concept of Internet, Applications of Internet, Connecting to Internet, What is ISP, Knowing the Internet, Basics of Internet Connectivity Related Troubleshooting, World Wide Web, Web Browsing Software's, Search Engines, Understanding URL, Domain Name, IP Address, Using E-Governance Website.
Communications and Collaboration: Basics of Electronic Mail, Getting an Email Account, Sending and Receiving Emails, Accessing Sent Emails, Using Emails, Document Collaboration, Instant Messaging, Netiquettes.

Unit-IV

Making Small Presentation: Basics of Presentation Software, Creating Presentation, Preparation and Presentation of Slides, Slide Show, Taking Printouts of Presentation/ Handouts. Using Multimedia for Making Interactive Presentations.

Unit-V

Financial Literacy for Banking Scheme and Applications: Role of Banking in Modern Economy, Banking Products-ATM Card, Banking Instruments-Cheque, Demand Draft (DD), Banking Services Delivery Channels, Know Your Customer (KYC), Opening of Bank Account and Documents Required, Types of Bank Accounts, Bank's Services Including Remittances, Loan,

Mobile Banking, Overdraft, Pension Etc., Pradhan Mantri Jan Dhan Yojana (PMJDY), Password Security and ATM Withdrawal, Insurance, Social Security Schemes-Atal Pension Yojana (APY), Pradhan Mantri Suraksha Bima Yojana (PMSBY), Pradhan Mantri Jeevan Jyotibima Yojana (PMJJBY), Pradhan Mantri Mudra Yojana (PMMY) and awareness about other similar Programmes.

References:

1. M. N. Doja, *Fundamentals of Computers and Information Technology*, ISBN 10: 8176296740 / ISBN 13: 9788176296748, Deep and Deep Publications.
2. Michael Price, *Office 2019: In Easy Steps,* ISBN : 9789388511148, BPB Publications.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

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Semester-III

Course Code	Course Title	Credit Value	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MIT-351	Database Management Systems	4	3	40	60	100
MIT-352	Data Mining	4	3	40	60	100
MIT-353	Software Engineering	4	3	40	60	100
Elective-I						
MIT-354	Information Security	4	3	40	60	100
MIT-355	IT Infrastructure Management	4	3	40	60	100
MIT-356	Mobile Computing and Development	4	3	40	60	100
Lab Course(s)						
MIT-381	Lab-5: Oracle	4	3	50	50	100
MIT-382	Lab-6: Data Mining	4	3	50	50	100
Total		**24**	**-**	**260**	**340**	**600**

IA: **Internal Assessment**

UE: University Examination

Course Code: MIT-351
Course Title: Database Management Systems
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

The aim of the course is to introduce students to the fundamental concepts necessary for designing, and implementing database systems. It emphasizes on 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 V/S File System, Introduction to DBMS, Advantages & Disadvantages of DBMS, Database Users.

Concept of Database System Architectures, Schemas and Instances, DBMS Architecture & Data Independence, Components of DBMS, Database Languages & Interfaces, Centralized & Client/Server Architectures of DBMSs.

Unit-II

PL/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.

Introduction to PL/SQL: Variables, Constants, Data Types, Pl/SQL Block Structure, Condition and Iterative Control Statements, Concept of Cursors & Trigger.

Unit-III

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-IV

Relational Database Design & Normalization: Concept of Functional Dependencies (Fully, Partial, Transitive), Normalization of Relational Database, Closure of Attribute Set, Canonical Cover, Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF), Join Dependencies.

Unit-V

Concurrency: 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, Deadlock & its Resolution.

Recovery Concepts, Recovery Techniques (Log Based, Shadow Paging, Checkpoint).

References:

1. Rames Elmasri, Shamkant B. Navathe, *Fundamentals of database Systems*, 7th Edition,

Pearson Education.
2. Avi Silberschatz,Henry F. Korth,S. Sudarshan ,*Database System Concepts*,7th Edition TMH
3. C. J. Date *An Introduction to Database Systems*, 8th Edition, Addison Wesley.
4. B. C. Desai, *An introduction to database Systems*, Revised Edition, Galgotia Publications.
5. Leon, *Database Management Systems*, 1st Edition, Vikas Publications.
6. I. Bayross, *Commercial Application Development using Oracle Developer 2000*, 2nd Edition, BPB.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-352
Course Title: Data Mining
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

The course will introduce concepts of data warehousing and data mining. It also introduces various techniques and tasks involved in data mining.

Unit I

Introduction: Fundamentals of Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, Data Mining Task Primitives, Integration Of A Data Mining System With a Database or A Data Warehouse System, Major Issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Unit II

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

Unit III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Unit IV

Classification and Prediction: Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or a Predictor, Ensemble Methods.

Unit V

Cluster Analysis Introduction: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Gridbased Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

References

1. M.J. Zaki and Wagner Mera Jr., *Data Mining and Analysis: Fundamental Concepts and Algorithms*, Cambridge University Press, 1st Edition, 2014.
2. Jiawei Han & Micheline Kamber, *Data Mining – Concepts and Techniques*, Morgan Kaufmann Publishers, Elsevier, 2nd Edition, 2006.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, *Introduction to Data Mining*, 1st Edition, Pearson education.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-353
Course Title: Software Engineering
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

This paper aims to help students to comprehend the role and scope of software engineering and equip them with the ability to apply Software Engineering practices.

Unit-I

Introduction to Software Engineering: Introduction, Evolving Role of Software, Concept of Software, Changing Nature of Software, Software Myths, Software Importance, Characteristics, Software Components, Software Crisis, Software Engineering Challenges (Scale, Quality Productivity, Consistency and Repeatability, Change), Software Standard, Software Engineering Approach.

Unit-II

Software Process Management: Characteristics of Software Process, Introduction to Software Process Models: Waterfall Model, Prototyping Model, Iterative Model, Spiral Model.
Planning: Cost Estimation, Uncertainties in Cost Estimation, COCOMO Model for Cost Estimation, Project Scheduling: Average Duration Estimation, Project Scheduling and Milestones, Introduction to Staffing.

Unit-III

System Analysis: Introduction to Software Requirement Analysis and Specification, Software Requirements: Need for Software Requirement Specifications, Requirement Process, Problem Analysis: Analysis Issues, Informal Approach, Structured Analysis (Data Flow Modeling), Object Oriented Modeling, Prototyping, Requirement Specification (Characteristics, Components), Metrics (Size & Quality).

Unit-IV

Software Design-I: Function Oriented Design: Design Principles (Problem Partitioning and Hierarchy, Abstraction, Modularity, Top-Down and Bottom-Up Approaches), Module level Concepts (Coupling and Cohesion), Design Notations & Specifications (Structured Charts, Specification), Structured Design Methodology.

Unit-V

Software Design-II: Object Oriented Design: OO Analysis and OO Design, Concepts of OOAD: Encapsulation, Abstraction, Inheritance and Polymorphism. Design Concepts. Design Notations & Specifications, Design Methodology: Dynamic Modeling, Functional Modeling, Defining Internal Classes and Operations.
Introduction to Software Testing: Testing Fundamentals: Error, Fault and Failure, Test Cases and Criteria, Psychology of Testing. Test Strategies for Conventional Software testing (Unit Testing, Integration Testing), Verification and Validation, Validation Testing(Validation Test Criteria, Configuration Review), System Testing, Debugging Process, Debugging Strategies, Testing Techniques (Black Box, White Box Testing).

References:

1. R. S. Pressman, *Software Engineering – A Practitioner's Approach*, 6th Edition, TMH.
2. P. Jalote, *An Integrated Approach to Software Engineering*, 3rd Edition, Narosa Publication.
3. SCHAUM'S Outlines, *Software Engineering*, 3rd Edition, TMH.
4. Sommmerville, *Software Engineering*, 9th, Addison Wesley.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Elective I

Course Code: MIT-354
Course Title: Information Security
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

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

Unit-I

Introduction to Concept of Security, Need for Security, Security Approaches (Security Models, Security Management Practices), Principles of Security, Types of Attacks (Theoretical Concepts, Practical Side of Attacks, Packet Sniffing, Packet Spoofing), Introduction to Cryptology, Cryptanalysis, Steganography.

Unit-II

Introduction to Cryptographic Techniques, Plain Text, Cipher Text, Substitution Techniques, Transposition Techniques, Encryption, Decryption, Symmetric Key Cryptography (Overview of DES), Key Range, Key Size, Possible Types of Attacks, Stream & Block Ciphers.

Unit-III

Public and Private Key Encryption Schemes, RSA Algorithm, Digital Signatures, Overview of Knapsack Algorithm, Public Key Infrastructure (PKI), Digital Certificates, Private Key Management, Diffie-Hellman Key Exchange Algorithm, PKIX Model. Authentication Protocols, Authentication Requirements, Authentication Functions, Message Authentication Codes, Cryptographic Hash, Message Digest Algorithms, MD5.

Unit-IV

Internet Security Protocols, Secure Socket Layer(SSL), Secure Hyper Text Transfer Protocol (Shttp), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), Electronic Money, Email Security, Wireless Application Protocol (WAP) Security. Network Security, Kerberos, X.509 Directory Authentication Service, Electronic Mail Security, PGP , Overview of IP Security, IP Security Architecture, Authentication Header, Encapsulation Security Payload.

Unit-V

System Security, Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, User Authentication Mechanism & Network Security, Authentication Basics, Passwords, Authentication Tokens, Certificate Based Authentication, Biometric Authentication and other Authentication Mechanisms, Firewalls and its Design Principles, Virtual Private Networks.

References:

1. William Stallings, *Cryptography and Network Security*: Principles and Practices, 7th Edition, PHI.
2. Atul Kahate, Cryptography and Network Security, 4th Edition, TMH.
3. Michael E. Whitman and Herbert J. Mattord, *Principles of Information Security*, 4th Edition, CENGAGE Learning.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory

objective 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.

Course Code: MIT-355
Course Title: IT Infrastructure Management
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

This subject will employ a research, reporting and presentation approach using the latest ICT tools to examine and critically analyze a combination of the technical and management issues in contemporary infrastructure management, with a focus on business alignment.

Unit I

Definitions, Infrastructure, Management Activities, Evolutions of Systems Since 1960s (Mainframes-to-Midrange-to-Pcs-to-Client-server Computing-to-New Age Systems) and their Management, Growth of Internet, Current Business Demands and IT Systems Issues, Complexity of today's Computing Environment, Total Cost of Complexity Issues, Value of Systems Management for Business.

Unit II

Factors to Consider in Designing IT Organizations and IT Infrastructure, Determining Customer's Requirements, Identifying System Components to Manage, Exist Processes, Data, Applications, Tools and their Integration, Patterns for IT Systems Management, Introduction to the Design Process for Information Systems, Models, Information Technology Infrastructure Library (ITIL).

Unit III

Service-Level Management, Financial Management and Costing, IT Services Continuity Management, Capacity Management, Availability Management.

Unit IV

Configuration Management, Service Desk, Incident Management, Problem Management, Change Management, Release Management

Unit V

Introduction Security, Identity Management, Single Sign-On, Access Management, Basics of Network Security, LDAP Fundamentals, Intrusion Detection, Firewall, Security Information Management. Introduction to Storage, Backup & Restore, Archive & Retrieve, Space Management, SAN & NAS, Disaster Recovery, Hierarchical Space Management, Database & Application Protection, Bare Machine Recovery, Data Retention.

References:

1. Efraim Turban, Ephraim R. McLean and James C. Wetherbe, *Information Technology for Managemen*t, 5th Edition, J. Wiley.
2. Kenneth C. Laudon and Jane P. Laudon , *Management Information Systems*, 15th Edition, Managing the Digital Firm.
3. Roger S Pressman, *Software Engineering: A Practitioner's Approach*. 7th Edition, McGraw-Hill.
4. James A. O'Brien , George M. Marakas, Ramesh Behl, *Management Information Systems*, 15th Edition, TMH.
5. Walker Royce, *Software Project Management: A Unified Framework*, 1st Edition, Pearson.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-356 **Maximum Marks:** 100
Course Title: Mobile Computing and Development **University Examination:** 60
L-T-P: 2-0-2 **Internal Assessment:** 40
Credits: 4 **Duration of Examination:** 3 Hours

Objective

By the end of this course, students will be able to describe those aspects of mobile programming that make it unique from programming for other platforms. Program mobile applications for Android Platform. Design and deploy applications for personal use and/or distribution.

Unit-I

Introduction: What is Android, Android Versions and its Feature Set, Major Android Devices in the Market, The Android Market Application Store, Android Development Environment-System Requirements, Installing Java, Installing and Configuring Android Studio, Creating Android Virtual Devices (Avds).

Android Architecture Overview: The Android Software Stack, The Linux Kernel, Android Runtime-Dalvik Virtual Machine, Android Runtime–Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project, Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Application, Reviewing the Layout and Resource Files

Unit-II

Android Software Development Platform: Understanding Java SE and the Dalvik Virtual Machine, the Directory Structure of an Android Project, Common Default Resources Folders, the Values Folder, Leveraging Android XML, Screen Sizes, Launching your Application: The Androidmanifest. Xml File, Creating your First Android Application.

Understanding Android Views, View Groups and Layouts, Designing for Different Android Devices, Views and View Groups, Android Layout Managers, the View Hierarchy, Designing an Android User Interface Using the Graphical Layout Tool, Graphical User Interface Screen With Views, Displaying Text With Textview.

Unit-III

Android Framework Overview: Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring your Components and Permissions.

Event Management: Event Handlers and Event Listeners, Touch Event, Multitouch Event, Advanced User Interface Libraries, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress With Seekbar, Working with Menus using Views.

Unit-IV

Displaying Pictures: Gallery, Imageswitcher, Gridview, and Imageview, Views to Display Images, Creating Animation, Files, Content Providers.

Databases: Saving and loading Files, SQlite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers.

Intents and Intent Filters: Intent Overview, Implicit Intents, Creating the Implicit Intent Example Project, Explicit Intents, Creating the Explicit Intent example Application, Intents with Activities, Intents with Broadcast Receivers, Android Drag and Drop Process, Debugging: Built In Debug Tools, Specifying Run Configuration, Debug through Breakpoints, Android Debug

Bridge.

Unit-V

A Basic Overview of Android Threads and Thread Handlers: An Overview of Threads, The Application Main Thread, Thread Handlers, A Basic Threading Example, Creating a New Thread, Implementing a Thread Handler, Passing a Message to the Handler,

Messaging and Location-Based Services: Sending SMS Messages Programmatically, Getting Feedback after Sending the Message Sending SMS Messages Using Intent Receiving, Sending Email, Introduction to Location-Based Service, Configuring the Android Emulator for Location-Based Services, GeoCoding and Map-Based Activities.

Multimedia: Audio, Video, Camera, Playing Audio and Video, Recording Audio and Video, Using the Camera to take and Process Pictures. Publishing Android Applications to App Store.

References:

1. I.F Darwin., 2017. *Android Cookbook: Problems and Solutions for Android Developers*, 3rd edition, O'Reilly Media.
2. R. Meier, *Professional Android, 4th Edition, Worx*.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

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

Semester-IV

Course Code	Course Title	Credit Value	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MIT-451	Artificial Intelligence	4	3	40	60	100
MIT-452	Web Technologies	4	3	40	60	100
MIT-453	Python Programming	4	3	40	60	100
MIT-457	Project	8	-	100	100	200
Elective-II						
MIT-454	Digital Forensics	4	3	40	60	100
MIT-455	Cloud Computing	4	3	40	60	100
MIT-456	Web Mining	4	3	40	60	100
Total		**24**	**-**	**260**	**340**	**600**

IA: **Internal Assessment**

UE: University Examination

Course Code: MIT-451
Course Title: Artificial Intelligence
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

The objective of the course is to introduce students to the basic concepts of Artificial Intelligence, which will help the students to get an insight into the type of topics that Artificial Intelligence deals with. The course is appropriate both, for students who wish to acquire general understanding of Artificial Intelligence as well as for students preparing for more advanced courses and research in Artificial Intelligence.

Unit-I

Introduction: Intelligence, Intelligent Machines, Strong and Weak AI, History and Evolution of AI, Applications of AI. Problem Solving: Classical Approach, Generate and Test Problem Representation, Components of Problem Solving, Two-One Problem, Searching: Search Strategies, Simple Search Algorithm (Depth-First Search, Breadth-First Search).

Unit-II

Progressive Deepening, Heuristically Informed Searches, Hill Climbing, Beam Search, Best First Search, Optimal Searches, Branch and Bound, Improvements in Branch and Bound, A* Procedure, Adversarial Search, Minimax Procedure, Alpha Beta Pruning.

Unit-III

Genetic Algorithm: Basic Genetic Algorithm, Solution of Problems using Genetic Algorithm, Eight Queens Problem. The AI Cycle, Knowledge and its Types, Knowledge Representation (Pictures, Graphs and Networks, Numbers), Formal Knowledge Representations Techniques (Facts, Rules, Semantic Networks, Frames and Logic), Reasoning and its Types.

Unit-IV

Introduction to Expert Systems, History and Evolution, Comparison of a Human Expert and an Expert System, Roles of an Expert System, Application of an Expert Systems, Expert System Structure: Knowledge Base, Working Memory, Inference Engine. Characteristics of Expert Systems, Inference Mechanisms (Forward Chaining, Backward Chaining), Expert System Development Life Cycle.

Unit-V

Fuzzy Systems: Introduction, Classical Sets, Fuzzy Sets, Fuzzy Logic, Boolean versus Fuzzy, Membership Function, Fuzzy Set Representation, Fuzzy Rules. Introduction To Biological Neural Network, Comparison of ANN with Biological Neural Network, Single Layer Neural Network Architecture. Introduction to Machine Learning, Comparison of Traditional and Machine Learning Algorithms, Applications of Machine Learning, Introduction to Machine Learning Types (Supervised, Unsupervised, Reinforcement Learning).

References:

1. S. Russel and P. Norvig, *Artificial Intelligence*: A Modern Approach, 3rd Edition, PHI.
2. R. Night, *Introduction to Artificial Intelligence*, 3rd Edition, TMH.
3. D. W. Patterson, *Introduction to Artificial Intelligence and Expert Systems*, Indian Reprint, 3rd Edition, PHI.
4. Martin T. Hagan, Howard B. Demuth, Mark Beale, Orlando De Jesús, *Neural Network design*, 2nd Edition, China Machine Press.

5. Tom Mitchell, *Machine Learning*, 1st Edition, McGraw- Hill.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-452
Course Title: Web Technologies
L-T-P: 2-0-2
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

This course is designed to acquaint the students of the basic concepts about .NET, C Sharp Programming Language, it also aims at imparting basic skills of creating, modifying and handling web pages and web portals and its deployment.

Unit-I

Introduction: Domain & Host Names, DNS Server, HTML Tags, Formatting Text, Controlling Fonts, Lists, Tables, Adding Pictures, Adding Links, Creating Forms Working with Text Boxes, Radio Buttons, Check Boxes, Dropdown Menu, Submit Button, Setting up Frames, Creating Web Pages, Introduction to CSS and its Properties

Unit-II

.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).

C# Basics: Conditional and Looping Statements, Manipulating Strings, Managing Errors and Exceptions

Unit-III

Classes and Objects: Introduction, Inheritance – Single and Multiple, Polymorphism- Function Overloading and Operator Overloading. Interfaces: Introduction, Defining an Interface, Extending an Interface, Implementing Interfaces. Delegates and Events: Introduction, Delegates, Delegate Declaration, Delegate Methods, Delegate Instantiation, Delegate Invocation, Using Delegates.

Unit-IV

Introducing ASP.NET:- Standard Controls in ASP.NET (Text Box, Button, Label, Image Control, Drop Down List, Check Box Control), Navigation Control (Tree View Control, Menu Control), Validation Control (The BaseValidator, RangeValidator, RequiredFieldValidator), Login Control(LoginName Control, LoginStatus Control), Request Object, Response Object.

Unit-V

Working with Data: 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 Bound Controls(List Control, Iterative Controls, View Controls), Managing Tables of Data(Gridview Object Model, Binding Data to Grid, Working with the GridView).

Crystal Reports: Creating Crystal Reports, Creating Custom Reports, Report Field Validation and Exporting Reports.

Reference Book:

1. Black Book, *ASP.NET 3.5*, Beginners Edition, 2009, Dreamtech Press.
2. Deitel & Deitel, *Internet & WWW HOW to Program*, 3rd Edition, 2005, PHI.
3. Dino Esposito, *Programming Microsoft ASP.NET 4*, 1st Edition, 2011, Dreamtech Press.
4. Simon et. al , *Professional C#,* 3rd Edition, Wrox Publications.
5. H. Schildt , *The Complete Reference C #*, TMH.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-453
Course Title: Python Programming
L-T-P: 2-0-2
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

This course is designed to introduce students to the concept of Python Programming. The course shall cover conditionals and loops, functions, Python data structures – lists, tuples, dictionaries and Python Libraries-Numpy & SciPy. Emphasis of the course is on enhancing programming skills of students toward research.

Unit-I

Introduction: History & Need of Python, Application of Python, Installing Python, Program Structure, Interactive Shell, Executable or Script Files, User Interface or IDE.
Variables, Expressions and Statements: Values and Types, Variables, Variable Names and Keywords, Operators and Operands, Expressions and Statements, Interactive Mode and Script Mode order of Operations.

Unit-II

Functions: Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Stack Diagrams.
Conditionals and Recursion: Modulus Operator, Boolean Expressions, Logical Operators, Conditional Execution, Nested Conditionals, Recursion.

Unit-III

Strings: Introduction of String, String Operations, String Methods and Functions.
Lists: Introduction, List Operations, List Methods and Functions.
Dictionaries: Introduction, Dictionaries Operations, Dictionaries Methods and Functions.
Tuples: Introduction, Tuples Operations, Tuple Functions and Methods.

Unit-I

Basic Concepts of Regular Expression and Pattern Matching.
Files: Persistence, Reading and Writing, Format Operator, Filenames and Paths Catching Exceptions, Databases, Pickling, Pipes, Scope Rules and Classes Scope Rules, Classes and Object-Oriented Programming
Numpy: Introduction to Numpy Arrays, Slicing Numpy Arrays, Indexing Numpy Arrays, Building and Examining Numpy Arrays
SciPy: Introduction To SciPy, Create Function, Modules of SciPy.

Unit-V

Matplotlib and Pyplot: Introduction to Matplotlib and Pyplot, Customizing Your Plots, Plotting Using Logarithmic Axes.
Case Study : Introduction to Classification, Introduction to KNN Classification, Finding the Distance between Two Points, Majority Vote, Finding Nearest Neighbors, Generating Synthetic Data, Making a Prediction Grid, Plotting the Prediction Grid

References:

1. John V. Guttag, *Introduction to Computation and Programming Using Python*, Revised and expanded Edition, MIT Press.
2. Allen B. Downey, *Think Python: How to Think Like a Computer Scientist*, 2nd Edition, Shroff, O'Reilly Publishers.
3. Guido van Rossum and Fred L. Drake Jr., *An Introduction to Python*, Network Theory

Ltd.
4. Robert Sedgewick, Kevin Wayne, Robert Dondero, *Introduction to Programming in Python: An Inter-disciplinary Approach*, 1st Edition, Pearson India Education Services Pvt. Ltd.
5. Timothy A. Budd, *Exploring Python*, 1st Edition, Mc-Graw Hill Education.
6. Kenneth A. Lambert, *Fundamentals of Python: First Programs*, 2nd Edition, CENGAGE Learning.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Elective II

Course Code: MIT-454
Course Title: Digital Forensics
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective
Upon completion of this course, students will have gained broad knowledge of computer crimes and forensics.

Unit-I
Computer Forensics Fundamentals: What is Computer Forensics, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resource/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists, Who Can Use Computer Forensics Evidence, Types of Computer Forensics Technology: Types of Military Computer Forensics Technology, Types of Law Enforcement, Computer Forensic Technology, Types of Business Computer Forensic Technology. Types of Vendor and Computer Forensics Services: Occurrence of Cybercrime, Cyber Detectives, Computer Forensics Investigative Services, Forensics Process Improvement.

Unit-II
Data Recovery: Data Recovery Defined, Data Back-Up And Recovery, The Role of Back-Up in Data Recovery, The Data Recovery Solution. Evidence Collection and Data Seizure- Why Collective Evidence, Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody. Duplication and Preservation of Digital Evidence - Preserving The Digital Crime Scene, Computer Evidence Processing Steps, Legal Aspects of Collecting and Preserving Computer Forensics Evidence, Privacy Issues.

Unit-III
Conducting Digital Investigations: Digital Investigation Process Models, Scaffolding for Digital Investigations, Applying the Scientific Method in Digital Investigations, Investigative Scenario: Security Breach. Handling a Digital Crime Scene-Published Guidelines for Handling Digital Crime Scenes, Fundamental Principles, Authorization, Preparing to Handle Digital Crime Scenes, Surveying the Digital Crime Scene, Preserving the Digital Crime Scene. Investigative Reconstruction with Digital Evidence: Equivocal Forensic Analysis, Victimology, Crime Scene Characteristics, Threshold Assessments.

Unit-IV
Violent Crime and Digital Evidence: The Role of Computers in Violent Crime, Processing the Digital Crime Scene, Investigative Reconstruction, Digital Evidence as Alibi - Investigating an Alibi, Time as Alibi, Location as Alibi. Sex Offenders on The Internet - Old Behaviors, New Medium, Legal Considerations, Identifying and Processing Digital Evidence, Investigating Online Sexual Offenders, Investigative Reconstruction, Case Example: Scott Tyree, Case Example: Peter Chapman. Computer Intrusions- How Computer Intruders Operate, Investigating Computer Intrusions, Forensic Preservation of Volatile Data, Post-Mortem Investigation Of A Compromised System, Investigation Of Malicious Computer Programs, Investigative Reconstruction. Cyberstalking: How Cyberstalkers Operate, Investigating Cyberstalking, Cyberstalking, Case Example.

Unit-V

Computer Basics for Digital Investigators: A Brief History of Computers, Basic Operation of Computers, Representation of Data, Storage Media and Data Hiding, File Systems and Location of Data, Dealing with Password Protection and Encryption Applying, Forensic Science to Computers: Preparation, Survey, Documentation , Preservation, Examination and Analysis, Reconstruction, Reporting, Digital Evidence on Windows Systems: File Systems, Data Recovery, Log Files, Registry, Internet Traces, Program Analysis. Digital Evidence on UNIX Systems- UNIX Evidence Acquisition Boot Disk, File Systems, Overview of Digital Evidence Processing Tools, Data Recovery, Log Files, File System Traces, Internet Traces, Digital Evidence on The Internet- Role of the Internet in Criminal Investigations, Internet Services: Legitimate versus Criminal Uses, Using The Internet as an Investigative Tool, Online Anonymity and Self-Protection, E-Mail Forgery and Tracking, Usenet Forgery and Tracking, Searching and Tracking on IRC.

References:

1. John R. Vacca*, Computer Forensics: Computer Crime Scene Investigation*, 1st Edition, Charles River Media, 2005.
2. Eoghan Casey, *Digital Evidence and Computer Crime Forensic Science, Computers and the Internet*, 3rd Edition, Elsevier, Academic Press.
3. Nelson Phillips and Enfinger Steuart, *Computer Forensics and Investigations*, 6th Edition, CENGAGE Learning.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-455
Course Title: Cloud Computing
L-T-P: 4-0-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

The skills derived from this course will help the students to from an understanding of analytic and design concepts of cloud architecture, so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.

Unit-I

Definition of Cloud Computing and its Basics: Defining a Cloud, Cloud Types – NIST Model, Cloud Cube Model, Deployment Models (Public, Private, Hybrid and Community Clouds), Service Models – Infrastructure as a Service, Platform as a Service, Software as a Service with examples of Services/ Service Providers, Cloud Reference Model Characteristics of Cloud Computing – A Shift in Paradigm, Benefits and Advantages of Cloud Computing.

Unit-II

Cloud Architecture: A Brief Introduction on Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols and Applications.
Understanding Services and Applications by Type: Services and Applications by Type IaaS – Basic Concept, Workload, Partitioning of Virtual Private Server Instances, Pods, Aggregations, Silos PaaS – Basic Concept, Tools and Development Environment with Examples SaaS - Basic Concept and Characteristics, Open SaaS and SOA, Examples of SaaS Platform Identity as a Service (IDaaS) Compliance as a Service (CaaS).

Unit-III

Understanding Abstraction and Virtualization: Concepts of Abstraction and Virtualization Technologies: Types of Virtualization(Access, Application, CPU, Storage), Mobility Patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D), Load Balancing and Virtualization: Basic Concepts, Network Resources for Load Balancing, Advanced Load Balancing(Including Application Delivery Controller and Application Delivery Network), Mention of the Google Cloud as an example of Use of Load Balancing, Hypervisors: Virtual Machine Technology And Types, VMware VSphere.
Concepts of Platform as a Service: Definition of Services, Distinction between SaaS and PaaS (Knowledge of Salesforce.Com and Force.com), Application Development Use of Paas Application Frameworks.

Unit-IV

Cloud Management: An Overview of the Features of Network Management Systems and a brief Introduction of Related Products from Large Cloud Vendors, Monitoring of an entire Cloud Computing Deployment Stack – An Overview with mention of some Products, Lifecycle Management of Cloud Services(Six Stages of Lifecycle).
Concepts of Cloud Security: Cloud Security Concerns, Security Boundary, Security Service Boundary Overview of Security Mapping Security of Data: Brokered Cloud Storage Access, Storage Location and Tenancy, Encryption, and Auditing and Compliance Identity Management (Awareness of Identity Protocol Standards).

Unit-V

Concepts of Services and Applications: Service Oriented Architecture: Basic Concepts of Message-Based Transactions, Protocol Stack for an SOA Architecture, Event-Driven SOA, Enterprise Service Bus, Service Catalogs. Applications in the Cloud: Concepts of Cloud

Transactions, Functionality Mapping, Application Attributes, Cloud Service Attributes, System Abstraction and Cloud Bursting, Applications and Cloud APIs. Cloud-Based Storage: Cloud Storage Definition – Manned and Unmanned. Webmail Services: Cloud Mail Services Including Google Gmail, Mail2Web, Windows Live Hotmail, Yahoo Mail, Concepts of Syndication Services.

References:

1. Barrie Sosinsky, *Cloud Computing Bible*, 1st Edition, Wiley India.
2. Rajkumar Buyya, *Christian Vecchiola & S. Thamarai Selvi Mastering Cloud Computing*, 1st Edition, McGraw Hill Education (India) Private Limited.
3. Anthony T. Velte, *Cloud Computing: A practical approach*, 1st Edition, Tata McGraw-Hill.
4. Michael Miller, *Cloud Computing* 1st Edition, Pearson.
5. Moyer, *Building applications in cloud: Concept, Patterns and Projects*, 1st Edition, Pearson.

Note for Paper Setting:

The question paper will be divided into two sections. Section A will include 10 compulsory objective 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.

Course Code: MIT-456
Course Title: Web Mining
L-T-P: 3-1-0
Credits: 4

Maximum Marks: 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective

The aim of this course is to make students understand the different application areas for Web Mining and to understand different methods to introduce to web-based data and the ways and means of handling such data.

UNIT–I

Introduction to Web Data Mining and Data Mining Foundations, Introduction – World Wide Web (WWW), A Brief History of the Web and the Internet, Web Data Mining-Data Mining, Web Mining. Data Mining Foundations – Association Rules and Sequential Patterns – Basic Concepts of Association Rules, Apriori Algorithm- Frequent Item set Generation, Association Rule Generation.

UNIT–II

Supervised and Unsupervised Learning Supervised Learning – Basic Concepts, Decision Tree Induction – Learning Algorithm, Impurity Function, Handling of Continuous Attributes, Classifier Evaluation, Rule Induction – Sequential Covering, Rule Learning, Classification Based on Associations, Naïve Bayesian Classification, Naïve Bayesian Text Classification – Probabilistic Framework, Naïve Bayesian Model . Unsupervised Learning – Basic Concepts, K-means Clustering – K-means Algorithm, Representation of Clusters, Hierarchical Clustering – Single link method, Complete link Method, Average link method, Strength and Weakness.

UNIT–III

Information Retrieval and Web Search: Basic Concepts of Information Retrieval, Information Retrieval Methods – Boolean Model, Vector Space Model and Statistical Language Model, Relevance Feedback, Evaluation Measures, Text and Web Page Preprocessing.

UNIT–IV

Link Analysis and Web Crawling: Link Analysis – Social Network Analysis, Co-Citation and Bibliographic Coupling, Page Rank Algorithm, HITS Algorithm, Community Discovery-Problem Definition, Bipartite Core Communities, Maximum Flow Communities, Email Communities.
Web Crawling – A Basic Crawler Algorithm- Breadth First Crawlers, Preferential Crawlers, Implementation Issues – Fetching, Parsing, Stopword Removal, Link Extraction, Spider Traps, Page Repository, Universal Crawlers, Focused Crawlers, Topical Crawlers, Crawler Ethics and Conflicts.

UNIT–V

Opinion Mining and Web Usage Mining Opinion Mining– Sentiment Classification– Classification based on Sentiment Phrases, Classification Using Text Classification Methods, Feature based Opinion Mining and Summarization – Problem Definition, Object feature extraction, Feature Extraction from Pros and Cons of Format1, Feature Extraction from Reviews of Format 2 and 3, Comparative Sentence and Relation Mining, Opinion Search and Opinion Spam. Web Usage Mining – Data Collection and Preprocessing- Sources and Types of Data, Key Elements of Web usage Data Preprocessing, Data Modeling for Web Usage Mining,
Discovery and Analysis of Web usage Patterns -Session and Visitor Analysis, Cluster Analysis and Visitor Segmentation, Association and Correlation Analysis, Analysis of Sequential and Navigation Patterns.

References:

1. George Chang, Marcus J. Healy, James A. M. McHugh & Jason T.L. Wang, *Mining the World Wide Web: An Information Search Approach*, 1st Edition, Kulwer Academic Publishers.
2. Anthony Scime, *Web Mining: Applications and Techniques*, 1st Edition, IGP.

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