MASTER OF SCIENCE IN INFORMATION TECHNOLOGY
(A Choice Based Credit System Effective from 2016-17)

1. Duration of the Course
The Master of Science in Information Technology programme will be of four semesters duration under Choice based Credit system which will be conducted in two years. Each semester will be of approximately 5 months (minimum 90 working days in a semester) duration.

2. Eligibility:
Candidates seeking admission to the first semester of M.Sc.(CBCS) Information Technology must have a B.Sc. or equivalent/B.C.A degree (10+2+3 scheme) with minimum 48% marks and also must have studied Mathematics in their degree programme from a recognized university.

3. **Admissions**:
Admissions to the first year of M.Sc.(IT) will be made as per admission rules for M.Sc.(CBCS)

4. Medium of Instruction
The medium of instruction and examination shall be English.
5. **No. of Seats:** As given in the Information bulletin

6. Curriculum
6.1 M.Sc.(IT) programme has a two year , four semester prescribed course structure which in general terms is known as curriculum. It prescribes courses to be studied in each semester as given below

6.2 M.Sc.(IT) programme shall have a curriculum and course contents (syllabi) for the courses recommended by the committee courses in Informatics and Computational Sciences and approved by the academic council of the university.

6.3 The programme shall follow Choice Based Credit System(CBCS) and will be governed by the Common Rules and Regulations of Masters programme under CBCS approved by the Academic Council of the University.

7. Courses of Study and Examination (2016-17)

Semester – I

course	Paper Name	L-T-P	No.of credits	Max. Marks		Total
				University Exam.	Internal Assessment	
1	2		3	4	5	6
M1MIT1-CT01	Computer Architecture	3-1-0	4	80	20	100
M1MIT2-CT02	Introduction to Programming	3-0-2	4	80	20	100
M1MIT3-CT03	Data Structure	3-1-0	4	80	20	100
M1MIT4-CT04	Discrete Mathematics	3-1-0	4	80	20	100
M1MIT5-CP01	Practical-I Data Structure Programming	0-0-8	4	80	20	100
M1MIT6-CP02	Practical-II Web Development Using HTML &	0-0-8	4	80	20	100

	CSS					
M1MIT7-SP01	Communication & Presentation Skill	0-0-4	2AC	80	20	100
	TOTAL		24(26)			

Courses of Study and Examination (2016-17)

Semester – II

course	Paper Name	L-T-P	No.of credits	Max. Marks		Total
				University Exam.	Internal Assessment	
1	2		3	4	5	6
M2MIT1-CT05	Database Systems	3-0-2	4	80	20	100
M2MIT2-CT06	Operating System	3-0-2	4	80	20	100
M2MIT3-CT07	Algorithms	3-0-2	4	80	20	100
M2MIT4-CT08	Object Oriented Programming using C++	3-0-2	4	80	20	100
M2MIT5-CP03	Practical-I: Algorithm Implementations	0-0-8	4	80	20	100
M2MIT6-EP01X	Practical-II: Elective Lab-I	0-0-8	4	80	20	100
M2MIT7-EP02	Practical-III: Minor Project OR Elective skill Enhancement Course- I	0-0-6	3	80	20	100
	Total		27			

Courses of Study and Examination (2016-17)

Semester – III

course	Paper Name	L-T-P	No.of credits	Max. Marks		Total
				University Exam.	Internal Assessment	
1	2		3	4	5	6
M3MIT1-CT09	Computer Networks	3-1-0	4	80	20	100
M3MIT2-CT10	Java Programming	3-0-2	4	80	20	100
M3MIT3-ET01X	Elective -1 (a) Basics of Data Science	3-0-2	4	80	20	100

	(b) Computer Graphics					
M3MIT4-ET02X	Elective-2 (i) Software Engineering (ii) Image Processing	3-0-2	4	80	20	100
M3MIT5-EP03X	Practical-I: Elective Lab-II	0-0-8	4	80	20	100
M3MIT6-EP04X	Practical-II: Elective Lab-III	0-0-8	4	80	20	100
M3MIT7-EP05	Practical-III: Minor Project / Elective skill Enhancement Course- II	0-0-6	3	80	20	100
M3MIT8-SP02X	Elective Skill Course-II	0-0-4	2AC	80	20	100
	Total		27(29)			

Courses of Study and Examination (2016-17)

Semester – IV

course	Paper Name	L-T-P	No.of credits	Max. Marks		Total
				University Exam.	Internal Assessment	
1	2		3	4	5	6
M4MIT1-PW01	Project Work	0-0-36	18	80	20	100
Total Credits: Final Semester Project External Examination will be conducted at the University Department/Computer Centre by a Committee						

Elective Technology Courses

Elective Lab-I

Web Application Development
1. Web Development using Dot NET
2. Web Development using PHP& MYSQL
Elective Lab-II
1. Android Programming
2. Microprocessor & Microcontroller Programming
Elective Lab-III
1. Big Data Analytics

2. Cloud Computing
3. Web Application Project*
(Only working projects tested and Accepted for implementation by hosting the application on web sites will be acceptable)

Skill/Certificate Courses – Electives for PG and UG courses in the area of Informatics and Computational Sciences

1. Communication and Presentation Skill
2. Scientific Writing Skill
3. Statistical Analysis of data
4. Numerical Analysis Techniques using MATLAB
5. Campus Network Configuration & Management
6. Big Data Analytics
7. Cloud Computing
8. Data Mining
9. Financial and Accounting Tools
10.Computer Animation

Extra Credit Courses

1.Summer Project
2. Internship
3. IT Industry Certification Courses

Course Code

Course codes are written in the following format

Masters programme (M)+Semester (1,2,34)+MIT(Information Technology Discipline)+Serial Number of Course in the Semester(01,02,03 etc)+ hyphen("-") +Course type [Core Theory (CT), Core Practical(CP), Discipline Specific Theory (ET), Discipline Specific Practical (EP), Skill Practical(SP)]+Group Code (A,B,C etc)

For example the Course code M1MIT01-CT01 should read as Master Programme First Semester Information Technology First Course-Core Theory Course-01
In the Course code M3MIT06- EP01A should read as Master Programme Third Semester Information Technology Sixth Course-Discipline Specific Elective Practical Course-01 Group-A

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

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SYLLABUS

First Semester

CourseM1MIT1-CT01: **Computer Architecture**

Unit I Processor Basics

Processor Basics: CPU Organization: Fundamentals, additional features. Data representation: Basic formats, fixed point numbers, floating-point numbers. Instuction sets: Instruction formats, instruction types, programming considerations.

Unit II Datapath Design

Datapath Design: Fixed point arithmetic: Addition and subtraction, multiplication, division. Arithmetic Logic Unit: Combinational ALUs, sequential ALUs. Advanced topics: Floating-point arithmetic, pipeline processing.

Unit III Control Design

Control Design: Basic concepts: Introduction, hardwired control, design examples. Micro-programmed control: Basic concepts, multiplier control unit, CPU control unit. Pipeline control: Instruction pipelines, pipeline performance, super-scalar processing.

Unit IV Memory Organization

Memory Organization: Memory technology: Memory device characteristics, random-access memories, serial-access memories. Memory systems: Multilevel memories, address translation, memory allocation. Caches: Main features, address mapping, structure versus performance.

Unit V System Organization

System Organization: IO and System Control: Programmed IO, DMA and interrupts, IO processors. Parallel processing: Processor-level parallelism, multiprocessors.

Text Books:

1. J.P. Hayes: Computer Architecture and Organization, McGraw-Hill International editions.

Course CT02:Introduction to Programming

Note: The practical aspects of the course must be taught as laboratory instructions using computers. Teacher is required to ensure that students carry out the computer implementation of the algorithm/program in the laboratory as a part of this course

UNIT - I

Algorithm development:problem identification, algorithms, flow charts, testing and debugging, algorithms for searching (linear and binary), sorting (selection, bubble & insertion), merging of ordered list, analysis of algorithm.

UNIT – II

Programming in C: history, structure of C programs, compilation and execution of C programs, debugging techniques, character set, keywords, data type and variables, expressions, operators, operator precedence and their order of evaluation.

Control statements - if-else, switch, break, continue, coma operator, goto statement. Loops - for, while, do-while.

UNIT – III

Functions: built-in and user-defined functions function declaration, parameter passing- call by value & call by reference, recursive functions. storage classes - auto, extern, global and static.

Array: one dimensional and multi-dimensional array, array handling, passing arrays to functions, arrays and strings, string-handling functions.

UNIT – IV

Pointers: pointer variable and its importance, pointer arithmetic, array of pointers, function of pointers, structure of pointers, dynamic memory allocation functions, pointer to pointer.

Structures and Union :declaration of structures, pointer to structure, array of structure, pointer to function, self-referential structure, unions, enumeration, macro.

UNIT – V

File handling: opening and closing data file, creating a data file, read and write functions, formatted and unformatted data files, command line arguments.

Recommended books : How to solve it by computer -G. Dromey
Programming with C – Schaum's outline Series

Course CT03: Data Structure

UNIT-I

Data Type - Data Object - Data Structure : Data abstraction and abstract data type; Notion of an algorithm - Complexity measures : Rate of growth, basic time analysis of an algorithm; ordering notion - detailed timing analysis - space complexity.

Arrays: Arrays and their representation-Single and multidimensional arrays-row major and column major ordering-address calculation.

Linked lists: Pointers and their uses- Continuous vs linked storage. Singly and doubly linked lists-Operations on lists-representation of Sparse matrices and polynomials using lists-Circular lists-generalized lists

UNIT-II

Storage management: Dynamic storage management-Reclamation and compaction-Boundary Tag method.

Stacks and Queues: Stacks and Queues-representation and Manipulation-Uses of stacks and Queues-Recursion, polish expressions

UNIT-III

Trees: Trees-Binary and N-ary trees-Representation of trees-Tree traversal algorithms-Threaded trees and advantages-Conversion of general trees to Binary trees-B trees-Applications: Decision trees, Game trees and expression parsing.

UNIT-IV

Graphs: Graphs and their representations**:** Matrix representation-List structure-Graph traversal algorithm, Application of graphs.

Strings and their features: Strings-Representation and Manipulation using Arrays and lists-String matching algorithms. Brute force, Knuth-Morris-Pratt and Boyer-Moore strategies.

UNIT-V

Sorting and Searching: Searching and sorting-Sequential, Binary and hashed Searching-Bubble sort, Insertion sort, shell sort, Merge sort and Quick sort-Comparison.

Tables: Decision tables-Symbol tables-Hash Tables-Examples of representation and implementation-Applications.

Reccomended Books :

1. Aho A.V. & Ullman J.E. : Data Structure & Algorithms
2. Aron M. Tannenbaum & Others : Data Structures using C
3. Mary E.S. Loomis : Data Management & File Structures
4. Bhagat Singh & Thomas Naps : Intrioduction to Data Structures
5. Trembley & Sorenson : An Introduction to Data Structures with Applications

Course CT04:Discrete Mathematics

UNIT-I

Set Theory: Introduction, sets and elements, universal set and empty set, subsets, venn diagram, set operations, algebra of sets and duality, finite sets, counting principle, classes of sets, power sets, partitions, mathematical induction.

Relations: Introduction, product set, relations, pictorial representation of relations, composition of relations, types of relations, closure properties, equivalence relations, partial ordering relations, n-ary relations.

UNIT-II

Functions: One-to-one onto and invertible functions, mathematical functions, exponential and logarithmic functions, sequences, indexed classes of sets, recursively defined functions, cardinality.

Logic and Propositional calculus: Propositions and compound propositions, basic logical operations, propositions and truth tables, tautologies and contradictions, logical equivalence, algebra of proposition, conditional and bi-conditional statements, arguments, logical implication, propositional functions, quantifiers, negation of quantified statements.

UNIT-III

Matrices: Matrix addition and scalar multiplication, matrix multiplication, transpose, square matrices, invertible matrices, inverse, determinants, elementary row operations, Gaussian elimination, boolean matrices.

UNIT-IV

Counting: Basic counting principles, factorial notation, binomial coefficient, permutations, combinations, the pigeon-hole principle, the inclusion-exclusion principle, ordered and unordered partition.

Probability Theory: Introduction, Sample space and events, finite probability space, conditional probability, independent events, independent repeated trials, binomial distribution, random variables.

UNIT-V

Property of Integers: Order and inequalities, absolute value, mathematical induction, division algorithm, divisibility, primes, greatest common divisor, Euclidean algorithm, fundamental theorem of arithmetic, congruence relation, congruence equations.

Recommended Books :

1. Lipschutz S., Lipson M. :Discrete Mathematics
2. Kolman B.,Robert C.B., Sharon R.: Discrete Mathematical Structures
3. Trembley J.P. and Manohar R.P. : Discrete Mathematical Structures with Applications o Computer Science.
4. Lew : Computer Science : A mathematical introduction

Course CP01: Practical-I :Data Structure Programming

Programming Exercises using C language based on Algorithm for data structures
List of programs will be made available on the course web site.

Course CP02: PRACTICAL -II :Web Development Using HTML & CSS

This course will be taught through practical training to prepare Web pages using HTML and CSS. Each student will be required to select independent web pages and web contents. List of practical will be available on course web site.

Second Semester

Course CT05 :Database Systems

Note: The practical aspects of the course must be taught as laboratory instructions using computers. Teacher is required to ensure that students carry out the computer implementation of the database concepts using MY SQL or MS Access in the laboratory as a part of this course

UNIT – I

Introduction : Database system applications, database systems versus file systems, views of data, data models, database languages, database users and administrators, transaction management, database system structure, application architecture.

Data modeling using the Entity Relationship Model**:**ER model concepts, notation for ER diagram, mapping constraints, keys, concepts of super key, candidate key, primary key, unique key, generalization, aggregation, reduction of an ER diagram to tables.

UNIT – II

Relational model : Structure of relational databases, relational algebra, tuple relational calculus, domain relational calculus.

SQL : Characteristics of SQL, advantages of SQL, types of SQL commands, SQL operators and their procedure, tables, views and indexes, queries and sub-queries, aggregate functions, insert, update and

delete operations, joins, union, intersection, minus, cursors in SQL. domain constraints, referential integrity, assertions, triggers, authorization and authentication.

UNIT - III

Relational database design & normalization : Functional dependencies, normal forms- First, second, third, BCNF, fourth and fifth normal forms, decomposition.
Indexing and Hashing: Basic concepts, ordered indices, B-tree, B+ tree, static hashing, dynamic hashing, comparison of ordered indexing and hashing, index definition in SQL, multiple-key access.

UNIT – IV

Query Processing & Optimization : Measure of query cost, selection operation, sorting, join operation, other operations, evaluation of expressions, estimating statistics of expression results, transformation of relational expression, evaluation plans, materialized views.

Transactions: Transaction concept, atomicity and durability, concurrent execution, serializability – conflict and view, testing of serializability.

UNIT - V

Concurrency Control : Concurrency Control, Locking Techniques for Concurrency control, Time stamping protocols for concurrency control, validation based protocols, multiple granularity, multi-version schemes, deadlock handling, insert and delete operations.

Recovery System : Failure classification, storage structure, recovery and atomicity, log based recovery, shadow paging, recovery with concurrent transactions, buffer management, backup systems.

Recommended Book : Database Systems Concepts - Korth
Fundamental of database system - Elmasiri and Navathe

Paper-II (MIT-202/MCA202):Operating systems

Note: The practical aspects of the course must be taught as laboratory instructions using computers. Teacher is required to ensure that students are capable of setting up a Linux server computer , learn commands and server management during the course so that computer implementation of the some of the topics can be tested by them in the laboratory as a part of this course

Unit I

Introduction to Operating Systems, Computer System Structures and Operating System Structures

Introduction to Operating Systems: What is an operating system? Mainframe systems, desktop systems, multiprocessor systems, distributed systems, clustered systems, real-time systems, handheld systems. Feature migration and computing Environments.

Computer System Structures: Computer system operation. I/O structure, storage structure, storage hierarchy, hardware protection, network structure.

Operating System Structures: System components, operating system services. System calls, system programs, system structure, virtual machines.

Unit II:
Processes and Threads

Processes: Process concept, process scheduling, operations on processes, cooperating processes, inter-process communication, communication in client-server systems.
Threads: Overview, multithreading models, threading issues.

Unit III
CPU Scheduling, Process Synchronization and Deadlocks

CPU Scheduling: Basic Concepts, scheduling criteria, scheduling algorithms, multiple-processor scheduling, real-time scheduling, algorithm evaluation.

Process Synchronization: The critical section problem, synchronization hardware, semaphores, classical problems of synchronization, monitors.

Deadlocks: System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Unit IV
Storage Management

Memory Management: Swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory: Demand paging, process creation, page replacement, allocation of frames, thrashing.

File System Interface: File concept, access methods, directory structure, file system mounting, file sharing, protection.

File-System Implementation: File system structure, file-system implementation, directory implementation, allocation methods, free space management, efficiency and performance.

Unit V

Protection and Security

Protection: Goals of protection, domain of protection, access matrix, implementation of access matrix, revocation of access rights.

Security: The security problem, user authentication, program threats, system threats, security systems and facilities, intrusion detection, cryptography.

Course CT-07 :Algorithms

Note: The practical aspects of the course must be taught as laboratory instructions using computers. Teacher is required to ensure that students carry out the computer implementation of the algorithm/program in the laboratory as a part of this course

UNIT-1

Algorithms Analysis:Algorithms and structured programming. Analysing algorithms, Asymptotic behavior of an algorithm, Order notations, time and space complexities (polynomial, logarithmic and exponential), average and worst case analysis, lower and upper bounds.

UNIT-2

Algorithm design strategies: Divide and conquer (Merge sort, Quick sort, matrix multiplication). Greedy method (knapsack problem, job sequencing with deadlines, minimum spanning trees). Basic search & Traversal Techniques (Breadth first and Depth first traversals of Graphs).

UNIT-3

Dynamic programming: 0/1 knapsack, Travelling salesman problem

Backtracking: 8-queen problem, sum of subsets, Graph coloring, 0/1 Knapsack **Branch & Bound**: 0/1 knapsack, Travelling salesman.

Algorithms on Graphs: Minimum cost spanning trees, depth-first search, bi-connectivity, strong connectivity, path finding problem, transitive closure algorithm

UNIT-4

Matrix algorithms: Basics, Strassen's matrix-multiplication algorithm, LU and LUP decomposition, inversion of matrices

Data structures for set manipulation problems: Fundamental operation on sets, a simple disjoint-set union algorithm, tree structures for UNION-FIND problem, applications and extensions of the UNION-FIND algorithm.

UNIT-5

Pattern matching algorithms: Finite automata and regular expression, recognition of regular expression, patterns, recognition of substrings, Conversion from NFA to DFA

Taxonomy of Classes: Problem classes P, NP, NP-hard and NP-complete, Theorems for some NP-complete problems

Text/Reference Books:

1. Fundamentals of Computer Algorithms, E. Horowitz, S. Sahni, Galgotia Publications,1985.
2. Design & Analysis of Computer Algorithms, Av. Aho, J.E. Hopcroft, & J.D. Ullman, Addition Wesley, 1974.
3. Design and Analysis of algorithms, S.K. Basu, PHI Publications

Course CT-08 Object Oriented Programming using C++

Note: The practical aspects of the course must be taught as laboratory instructions using computers. Teacher is required to ensure that students carry out the computer implementation of the algorithm/program in the laboratory as a part of this course

UNIT – I

Different paradigms for problem solving, need for OOP, differences between OOP and procedure oriented programming, abstraction, overview of OOP principles- encapsulation, inheritance and data binding polymorphism. abstraction.

C++ basics: structure of a C++ program, data types, declaration of variables, expressions, operators, type conversions, pointers and arrays, strings, structures, references, flow control statement, functions-scope of variables, parameter passing, recursive functions, default arguments, inline functions, dynamic memory allocation and deallocation operators.

UNIT – II

C++ classes and data abstraction: class definition, class structure, class objects, class scope, this pointer, static class members, constant member functions, constructors and destructors, dynamic creation and destruction of objects, friend function and class, static class member.
Overloading : function overloading, operator overloading – unary, binary operators.

UNIT - III

Inheritance: defining a class hierarchy, different forms of inheritance, defining the base and derived classes, access to the base class members, base and derived class construction, destructors, virtual base class.

Polymorphism: static and dynamic bindings, base and derived class virtual functions, dynamic binding through virtual functions, virtual function call mechanism, pure virtual functions, abstract classes, implications of polymorphic use of classes, virtual destructors.

UNIT - IV

Templates - function templates and class templates, overloading of function template, static class member in class template.

Exception handling: benefits of exception handling, throwing an exception, the try block, catching an exception, exception objects, exception specifications, rethrowing an exception, catching all exceptions.

UNIT-V

File handling : stream classes hierarchy, stream I/O, file streams, opening and closing data file, creating a data file, read and write functions, error handling during file operations, formatted I/O, sequential and random file processing.
Standard template library (STL): component of STL, containers, iterartors, algorithms, application of container classes.

Recommended book : Object Oriented Programming with C++ : E. Balagurusamy

Course CP-03 :Practical-I: Algorihm Implementations

Practical exercise to implement various algorithm using C++. List of practical will be made available on web site

Course EP-01 Elective Technology Lab-I

Web Application Development Laboratory courses

Students will be required to select one course from following

EP-01A. Web Development using Dot NET
EP-01B. Web Development using PHP& MYSQL

These courses will be taught through practical training to develop web applications using the technologies. Each student will be required to select independent applications and web contents. List of practical will be available on course web site.

Course EP-02 Course EP-01 Minor Project

Students will have to carry out one Project work during

Third Semester

Course CT-09 :Computer Networks

UNIT-I

Protocol Architecture : Overview: Communication model, Communication Tasks, Data Communication Networking: WAN, LAN,Wireless Networks. Basics of Network Software: Protocol and protocol architecture, Protocol functions, Design Issues for the layers, interfaces &Services, Connection oriented and connectionless services, service primitives, relationship of services to protocols , ISO REF Models, TCP/IP Model.
Data Communications: Data Transmission: Concepts of Frequency,Spectrum, bandwidth, Electromagnetic spectrum and frequencies for data communication, Fourier analysis , Data and signal, Transmission impairments, channel capacity, Nyquist bandwidth, Shannon capacity formula ,decibels and signal strength, Transmission media:Coaxial, twisted pair, Comparative study of Categories of cables, Coaxial, Optical Fibers, Wireless transmission: TerrestialMicrowave, satellite,Broadcast Radio,Infrared,.

UNIT-II

Data Encoding: BCA (NRZ,Bipolar AMI, B8ZS, HDB3,ASK,FSK,PSK,PCM,AM,FM,PM), Spread Spectrum. Asynchrous and Synchronous transmission, Full and Half duplex, Interfacing, Functional and Procedural aspects of V.24,
Data Link Control: Flow control: Stop and Wait, Sliding window, Error detection: Parity Check,CRC. Error control: Stop and Wait ARQ, Go back-N ARQ, Selective-Reject ARQ, Brief idea of HDLC and other Data Link control protocols

UNIT-III

Circuit Switching: Simple switching Network, Circuit Switching Networks, Circuit Switching Concepts: Space Division switching, Time Division Multiplexing, Routing in circuit switching Networks, Contrl Signalling, Inchannel & common channel signaling, Brief idea of SS7. Packet Switching: Packet switching principles, Routing,X.25

UNIT-IV

LAN Technology: LAN architecture, IEEE 802 standards, Ethernet (CSMA/CD): Medium Access Control, 10, 100, Gigabit Ethernet. Brief survey of other LAN systems (Token ring,FDDI,ATM, Fiber channel). Wireless LANS, Bridges, Latest trends in LAN technologies
LAN Devices: Study of specifications of L2 and L3 switches, Structured cabling, Passive components.

UNIT-V

Principles of Internetworking, connection less Internetworking, IP, IPv6, IP multicasting. Routing protocols, TCP, UDP, SNMP,SMTP and MIME, HTTP

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Recommended Books :

1. William Stallings: Data & Communications,Sixth Edition
2. A. S. Tanenbaum : Computer Networks

Course CT010: JAVA Programming

UNIT-I

Introduction to Java: Bytecode, features of Java, data types, variables and arrays, operators, control statements.

Objects & Classes: Object Oriented Programming, defining classes, static fields and methods, object construction

UNIT-II

Inheritance: Basics, using super, method overriding, using abstract classes, using final with inheritance.

Packages and Interfaces: Defining a package, importing package, defining an interface, implementing and applying interfaces.

UNIT-III

Exception Handling: Fundamentals, exception types, using try and cache.

Multithreaded Programming: Creating a single and multiple threads, thread priorities, synchronization.

UNIT-IV

Applets: Applets basics, applets architecture, applets skeleton, the html applet tag, passing parameters in applets.

Event Handling: Event classes and event listener interfaces.

UNIT-V:

Graphic Programming Introduction to swings.

Recommended Books :

1. P. Naughton and H. Schildt: The complete reference to Java, Tata Mc-Graw Hill.

2. Deitel and Dietel: How to program in Java

Course ET-01:Introduction to Data Science

UNIT-1:

Data Manipulation at Scale Databases and the relational algebra, Parallel databases, parallel query processing, in-database analytics

MapReduce, Hadoop, relationship to databases, algorithms, extensions, languages
Key-value stores and NoSQL; tradeoffs of SQL and NoSQL

UNIT-II

Analytics Topics in statistical modeling: basic concepts, experiment design, pitfalls
Topics in machine learning: supervised learning (rules, trees, forests, nearest neighbor, regression), optimization (gradient descent and variants), unsupervised learning

UNIT-III:

Communicating Results
Visualization, data products, visual data analytics,Provenance, privacy, ethics, governance

UNIT-IV

Special Topics
Graph Analytics: structure, traversals, analytics, PageRank, community detection, recursive queries, semantic web

Unit-V

Review of Basic Data Analytic Methods Using R 63

Introduction to R,, R Graphical User Interfaces, Data Import and Export , Attribute and Data Types,Descriptive Statistics,Exploratory Data Analysis,Visualization Before Analysis , Dirty Data ,Visualizing a Single Variable,Examining Multiple Variables, Data Exploration Versus Presentation , Statistical Methods for Evaluation, Hypothesis Testing,Difference of Means,Wilcoxon Rank-Sum Test,Type I and Type II Errors , Power and Sample Size , ANOVA

Course ET-02:Computer Graphics

UNIT-1

Geometry and Line generation: Lines, Line segments and perpendicular lines, distance between a point and a line, vectors, pixels, frame buffers, vector generation, Bresenham's algorithm, anti-aliasing of line, thick line segments, character generation, display the frame buffer.

Graphics Primitives: Display devices, primitive operations, Display file interpreter, Normalized device co-ordinates, Display file structure and display file algorithms, Display control, text, Line style primitives.

UNIT-2

Polygons: Polygon representation, Entering polygons, Polygon interfacing algorithms, filling polygons, filling with a pattern, Initialization, Antialiasing.

Segments: Creation of segment, Closing, deletion and renaming segments, visibility, image transformations, saving and showing segments.

UNIT-3

2D and 3D Transformations: Matrices, Scaling transformations, Rotation, Homogeneous co-ordinates and Translations, Co-ordinate transformations, Rotation about an arbitrary point, Inverse transformations, Transformation routines, Transformation and patterns, Initialization, Display procedures. 3D geometry, 3D primitives and transformations.

UNIT-4

Windowing and Clipping: The viewing transformation and its implementation, Clipping, Cohen Sutherland Outcode algorithm, Clipping of polygons, generalized clipping, Multiple windowing, Parallel projection, Viewing projections and special projections, Conversion to view plane co-ordinates, Clipping in three dimensions, Clipping planes.

UNIT-5

Hidden surfaces and Lines: Back-face algorithm, Z-buffers, Scan line algorithm, Franklin algorithm, Illumination, Transparency, Reflection, Shadows, Ray tracing, halftones, Color Models

Text/Recommended Books:

1. Steven Harrington:- Computer Graphics: A programming Approach

Course ET-03:Software Engineering

Unit I

Software Engineering Fundamentals: Definition of Software, Software characteristics, Software Applications.

Software Process: Software Process Models - Waterfall model, prototyping model, spiral model, incremental model, concurrent development model.

Project management Concepts: The Management Spectrum - The People , The Product , The Process , The Project.

Unit II

Software Process and Project Metrics : Measures , Metrics and Indicators , Software measurement : Size - Oriented Metrics , Function - Oriented Metrics , Extended Function point metrics

Software Project Planning : Project Planning Objectives , Software Project Estimation , Decomposition Techniques - Problem Based Estimation , Process Based Estimation ,Empirical Estimation Models- The COCOMO Model

Risk Analysis and Management: Software risks, Risk identification, Risk Projection, Risk Refinement, Risk Mitigation , Monitoring and Management.

Unit III

Software Quality Assurance: Basic concepts- Quality, Quality Control, Quality Assurance, Cost of Quality , Software Quality Assurance (SQA) , Formal Technical Review

Software Configuration Management: Baselines , Software Configuration Items, The SCM Process, Version Control, Change Control, Configuration Audit, Status Reporting.

Analysis Concepts and Principles: Requirements Elicitation for Software **,**Analysis Principles **-** The Information Domain, Modeling, Partitioning, Essential and Implementation Views, Specification: Specification Principles, Representation, The SoftwareRequirement Specification (SRS)

Unit IV

Design Concepts andPrinciples: Design Principles , Design Concepts – Abstraction, Refinement, Modularity, Software Architecture, Control Hierarchy, Structural Partitioning, Data Structure, Software Procedure, Information Hiding , Effective Modular Design- Cohesion , Coupling

Software Testing: Testing Objectives & principles, Unit Testing, Integration Testing (Top Down Integration , Bottom Up Integration , Regression Testing, Smoke Testing), Validation Testing (Alpha and Beta Testing), System Testing (Recovery Testing, Security Testing, Stress Testing, Performance Testing).

Unit V

Reengineering: Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering

CASE Tools: What is CASE, Building Blocks of CASE, A Taxonomy of CASE Tools, Integrated CASE Environments, The Integration Architecture, The CASE Repository.

Recommended Books:

1. R. Pressman: Software Engineering, McGraw-Hill.

2. K.K. Agrawal and Y. Sing: Software Engineering, New Age International.

3. P. Jalote: Software Project Management in Practice, Pearson.

Course ET-04:Image Processing

UNIT - I

Image presentation and transform : Elements of visual perception, colour representation, Image capture, representation and storage. gray level transformation, histogram equalization, multi-image operations.

Image transform : Discrete Fourier transforms (DFT), Discrete cosine transform (DCT), Walsh-Hadamard transform, Haar transform, Karhunen-Loeve transform, singular value decomposition.

UNIT - II

Image enhancement : Contrast Intensification – linear stretching, Non-linear stretching, histogram specification, modifying gray level co-occurrence matrix, smoothing – image averaging, mean filter, order statistic filter, edge preserving smoothing, low pass filtering, Image sharpening – high pass filtering, homomorphic filtering.

UNIT - III

Image restoration: Mean square error restoration, least-square error restoration, restoration by singular value decomposition, restoration by maximum a posterior estimation, restoration by homomorphic filtering – distortion model and range of parameter, filtering procedure and related problems.

UNIT - IV

Image compression: Fidelity criteria, run length coding, Huffman coding, LZW, arithmetic coding, JPEG encoder and decoder , vector quantization compression.

UNIT - V

Image segmentation : Region extraction, pixel based approach, multilevel thresholding, local thresholding, region based approach – growing, splitting, merging, split and merge techniques.
Recommended books : Digital Image processing and analysis - B. Chandra and D. Majumder
Fundamental of digital image processing - Anil K. Jain

Course EP02X:Practical-I: Elective Technology Lab -II

EP01A: Android Programming
EP02A: Microprocessor and Microcontroller Programming
These courses will be taught through practical training to develop applications using the technologies. Each student will be required to select independent applications. List of practical will be available on course web site.

Course EP03X:Practical-I: Elective Technology Lab -III

EP03A: Big Data Analytics
EP03B: Cloud Computing
EP04C: Web application Projects

Course EP-02 Course EP-01 Minor Project

Students will have to carry out one Web Application Project
(Only working projects tested and accepted for implementation by hosting the application on web sites will be acceptable)

Fourth Semester

Paper - I :(MIT - 401) Project Work

Only the projects submitted by the candidates as per following guidelines will be evaluated
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1. Project to be selected by the student at the end of fifth Semester
2. The project must be of approximately 400 man hours and so certified by the supervisor of the project
3. The project must be submitted in the form in consonance with the format enclosed
4. Monthly progress report must be submitted through supervisor in the enclosed format.
5. Project must be submitted before the prescribed last date .
6. Candidates are required to make a presentation of their project work during their project examination
7. Students whose Projects graded as unsatisfactory will given one more chance to undertake another project under another supervisor /organization.
8. The project work of the candidates whose monthly progress report is not submitted will be considered as incomplete and may be terminated within two weeks from the prescribed due date.
9. Students will be allowed to undertake project works only at the bonafide organizations.
10. Students are required to give two seminars during the project work, one at the end of 2nd month and another at the end of 4th month. However, candidates working for their project in organizations outside the state need to give only one seminar during the entire project period.
11. Examination of the project work will be conducted by a committee consisting of at least two internal examiners and one external examiner.

Guidelines for Project in partial fulfillment of the requirement of M.Sc.(IT)course

(a) The project will consist of two parts:

- Documentation; and

- Viva-voce

(b) The source-code and the executable code have to be submitted on CD and student must demonstrate working of the software.

(c) Project shall be original and not copied from the existing material from any source and a certificate, as per format given will be provided with the Project, duly countersigned by the supervisor.

(d) Project will be submitted only when the candidate completes all papers though he or she may start the projects earlier.

(e) Presentation of the Project will be in the accepted norms; as laid down in various text-books; IEEE standard/ ISO standards etc., are some models to follow.

(f) As far as possible, the Project should be of real life value.

(g) Though the Project is given 480 hours, the student is expected to use his/her discretion to ensure that it is large enough to be of practical value.

(h) The number of hours will not include the hours for writing and documentation of the Project.

(i) During the presentation of the Project at via-voce the candidate is advised to have a computer based or an overhead project presentation material handy.

PERFORMA FOR CERTIFICATE

This is to certify that this is a bonafied record of the Project entitled
_____ was done satisfactory at
_____ by Mr./Ms
_____ in partial fulfillment of M.Sc.(IT) course. He/ She has successfully completed all the subjects.
This report had not been submitted for any other examination and does not form part of any other course undergone by the candidate.
PLACE:

DATE: SIGNATURE

NAME:
DESIGNATION:
(Name & Seal of organization of Supervisor)

PROFORMA FOR THE PROJECT REPORT

1. Title of the Project

2. Objectives

3. Input to the Project

4. Output generated

5. Details of Hardware Platform used

6. Details of Software Tools used

7. Implementation Issues (Clearly defining the area of Application).

8. Miscellaneous

9. Signature of the Candidature.

GUIDELINES FOR THE CHAPTERS AND SECTIONS

1. Microscopic Summary

2. Details of candidate and Supervisor along with certificates of :

- Original Work;
- Assistance if any;
- Credits.

3. Aims and Objectives

4. Approach to Project and Time Frame

5. Project Design Description with Appendices to cover:

- Flow Charts/Data Flow Diagram-Macro/Micro level
- Source Code
- Hardware Platform
- Software Tools
- Security measures
- Quality Assurance
- Auditability

6. Test Data and Result.

The project report must be prepared for the external examination. Monthly report of the students must be taken to monitor progress and must be placed for evaluation by external examiner. Projects submitted by the students shall be evaluated during external evaluation to ensure independent contribution and proficiency acquired by the students

.

Note: Students must be allotted projects in the beginning of the session. Candidates submitting ready made projects/copied/ projects developed by professionals in the market etc shall be awarded zero marks.

Two copies of the project report and the software developed must be submitted to the external examiner. One copy of the project shall be returned to the student with the signature of external examiner.

Skill Oriented Elective Course: Information and Communication Technology

(This course may be offered also as Separate Certificate Course by Colleges/Departments to award Certificate Course in ICT
Eligibility: Students of UG and PG classes admitted to Mohanlal Sukhadia University,Udaipur)
Detailed Syllabus for Information and Communication Technology Certificate and Skill based course (Students of M.Sc. (IT) and MCA are not eligible to offer this course).

1. Study of various components of a Personal Computer System: identifying the system unit, different Input units, output units. Looking inside a system unit: Block diagram of a typical mother board, various components: CPU, memory, chipsets, Bus slots, various ports,SMPS, Hard disk drives, CD/DVD drives, various connectors

   (This practical must be carried out by first explaining the block diagram of typical motherboard, reviewing basic concepts about CPU, memory, storage, input out put systems, explaining specifications of a typical PC and then demonstration of identification of various motherboard components).
2. Study of input and output ports of a PC, USB Cable, Network cable and its pin connections, Blocking and permitting access of Devices attached to USB ports.

3. Operating System Software: Brief survey of Windows OS, its components. Creating Folders, files, backing and restoring files, Working with Notepad and Word pad, Understanding and working with Control panel components, understanding and working with BIOS options.

4. Word processing: Creating and editing a document, creating reports and tables, changing view of the document, formatting a document, use of mail merge. Converting word file to a PDF file and printing files.

5. Electronic Spread Sheet: Creating and editing work book, various operations with Cells, use of formulae, formatting, creating charts ,pivotal tables and managing work book, Various saving options. Use of MS Excel to create an address book
6. Database system: MS Access, Creating a database, modifying table, creating forms, Queries and reports, importing and exporting options. Using MS access to create a Telephone directory

7. Creating a Power point presentation, Modifying and Refining Presentation. Use of advance features of Power point. Creating a good multimedia presentation
8. Internet connectivity , testing and setting internet connection to a PC, Use of Google and understanding various searching options, use of google drive and Drop box , creating email account , Creating web pages using HTML, hosting web pages, Creating web pages of your resume and hosting it.
9. Using Personal Information manager, use of calendar for managing various tasks, Antivirus protection, compressing files, encrypting and decrypting files. Online filling of forms.
10. (a) Preparation of a 10 page report consisting various type of contents like tables, scientific formulae, pictures, text matter in English as well as in Hindi
    (b) Preparation of expenditure accounts using MS Excel with text matter in Hindi and English
    (c) Preparation of a database of 50 library book catalogue using MS access
    (d) Preparation of a Power point presentation in a topic of your choice

Seats: Not exceed 40 in a batch. One computer /student must be made available.

Examination: Practical examination for 4 hrs duration to test skills acquired by the candidate. Either manual or Computerized online test may also be conducted to test typing speed and efficiency of the candidate in Word processing.

Only candidates having a minimum level of skill in the use office automation tools to carry out the job of an office assistant. The grades or marks awarded must reflect the skills acquired by the candidate.

Marks: external 80, Internal:20

Certificates will be issued for candidates opted for Certificate Course. Fee recommended: Rs 2000/- under SFS programme. For candidates opting this course as an elective skill course will be awarded credits as per rules of Choice Based Credit System.

Skill/Certificate Courses – Departmental Electives

MITSP-01. Statistical Analysis of data
MITSP-02. Numerical Analysis Techniques
MITSP-03. Campus Network Configuration & Management
MITSP-04. Big Data Analytics
MITSP-05. Cloud Computing
MITSP-06. Data Mining
MITSP-07. Accounting using Tally
MITSP-08. Computer Animation

These courses will be taught through practical training using the relevant technologies. Each student will be required to select independent applications/Practical. List of practical will be available on course web site.