Semester - II

Semester-II(24 Credit Semester)						
Course Code	**Course name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
16 Core Credit Units						
MIT-2T1-C	Data and File Structures	Core	3	0	2	4
MIT-2T2-C	Computer Graphics	Core	3	0	2	4
MIT-2T3-C	Software Engineering	Core	4	0	0	4
MIT-2T4-C	Computer Organization and Architecture	Core	4	0	0	4
6 Elective Credit Units						
MIT-2E1-DCE	Operational Research	DCE	3	0	0	3
MIT-2E2-DCE	Open Source Technologies	DCE	3	0	0	3
MIT-2E3-DCE	Information Systems	DCE	3	0	0	3
MIT-2E4-DCE	Green Technologies	DCE	3	0	0	3
2 credit units to be taken from outside departments						

Course No.: MIT-2T1-C
Course Title: Data & File Structures

UNIT I

INTRODUCTION TO DATA STRUCTURE: Data Management concepts, Data types – primitive and non-primitive, Performance Analysis and Measurement (Time and space analysis of algorithms-Average, best and worst case analysis), Types of Data Structures- Linear & Non Linear Data Structures.

UNIT II

LINEAR DATA STRUCTURE Array: Representation of arrays, Applications of arrays, sparse matrix and its representation Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked implementation of Stack, Linked implementation of Queue, Applications of linked list.

UNIT III

NONLINEAR DATA STRUCTURE : Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), Threaded binary tree, Binary search trees, Conversion of General Trees To Binary Trees, Applications Of Trees, AVL trees, 2-3 trees, Height Balanced, Weight Balance, Graph-Matrix Representation Of Graphs, Elementary Graph operations,(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree)

UNIT IV

HASHING AND FILE STRUCTURES : Hashing: The symbol table, Hashing Functions, Collision Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods, Sorting – Bubble Sort, Selection Sort, Quick Sort, Insertion Sort Merge Sort, Searching – Sequential Search and Binary Search

REFERENCES:

1. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Tata McGraw Hill.
2. Data Structures using C & C++ -By TenenbaunPrenctice-Hall International.
3. Fundamentals of Data Structures in C++-By SartajSahani.
4. Data Structures: A Pseudo-code approach with C -By Gilberg&Forouzan Publisher Thomson Learning.

Course No.: MIT-2T2-C
Course Title: Computer Graphics

UNIT I

Introduction to Computer Graphics. Applications of Computer Graphics. Graphic Display Devices_ Raster, Refresh, Random. Display Buffer, Concept of Double Buffering and Segmentation of Display Buffer. Use of Lookup tables.

UNIT II

2-D Graphics. Cartesian and Homogeneous Coordinate Systems. Line drawing algorithms (Bressenham's and DDA). Circle and Ellipse Drawing Algorithms. 2-Dimensional Transformations. Concepts of Window & Viewport, Window to Viewport Transformations. Filling, Boundary and Flood fill algorithms.

UNIT III

Clipping, Line Clipping Algorithms (Cohen-Sutherland Algorithm), 3-D Graphics, Projections: perspective and parallel projection transformations. 3-Dimensional Transformations. Hidden Surface Removal Techniques, Z-Buffer Algorithm, Back Face Detection.

UNIT IV

Curves and Surfaces, Splines, Spline specification, Interpolated & Approximated Splines. Bezier Splines, Bezier Curves, Cubic Bezier Curves, Bezier Surfaces. B-Splines curves and surfaces. Fractals - Fractal Generation Procedure. Introduction to Illumination models and Surface rendering methods.

TEXT BOOK:

1. Hearn **and Baker** " Computer Graphics" 2nd Edition , **Pearson Education.**

REFERENCES:

1. W.M.Newman and Sproull. "Principles of interactive Computer Graphics" ,TMH
2. Steven Harrington." Computer Graphics a Programming Approach" McGraw Hill.
3. Plastock and Kelley. "Schaums outline of theory and problems of computer Graphics"
4. David F Frogers and J Alan Adams. "Procedural Elements of Computer Graphics" McGraw Hill
5. David F Rogers and J Alan Adams. "Mathematical Elements of Computer Graphics" McGraw Hill
6. James. D. Foley, A Vandametal "Computer Graphics" Pearson.

Course No.: MIT-2T3-C
Course Title: Software Engineering

UNIT I

Software Engineering: Definition & Evolution, its Role & Impact in Computer Science. Software Process, Characteristics of a SW Process, CMMI, TSP & PSP, Software Product, Characteristics of a Good Software Product, Software Process Models, Comparative Study & Applications. Basic concepts of Agile Process.

Software Requirements Analysis (SRA): Requirements - Types, Steps Involved in SRA. SW Requirements Specification (SRS): Need & Characteristics for an SRS, Components of an SRS, Prototype for a Good SRS. Structured Analysis: DFD'S, Control Flow Diagrams, Data Dictionary, State Transition Diagrams, and Entity - Relationship Diagrams. Case Study: Developing a Complete SRS.

UNITII

Software Design: Concepts & Principles, Design Considerations & Good Design. Characterization of Effective Modular Design (Functional Independence, Cohesion, Coupling). Design: Architectural Design, Procedural Design, Interface Design, & Data Design. SW Architecture Styles: (Dataflow, Call & Return Architectures, Independent Process Architectures, Virtual Machine Architectures). Concept of Verification & Validation. Goals of SW Testing, Testing Principles.

UNIT III

Approaches to the Design of Test Cases: Black Box & White Box Testing, Techniques used by these Approaches: Basis Path & Loop Testing, Graph Based Testing, Equivalence Partitioning, Cyclomatic Complexity, Documentation of Test Cases, Phases in Testing Activity : Unit, Integration, Validation & System Tests.

Software Project Management, Phases of Management, Project Planning & Control, Scheduling, Organization & Team Structures, Project Estimation Techniques – KLOC, FP & COCOMO, Risk Analysis & Management, Software Quality Assurance, Software Configuration Management.

UNIT IV

Technical Metrics for Software. Object Oriented Software Engineering: Object Oriented Paradigm, Concepts - Classes & Objects, Inheritance, Abstraction & Polymorphism. Concept of OOA & OOD. Design Methodology: Dynamic Modeling, Functional Modeling.

Advanced Concepts: Software Reuse, Re-engineering, Reverse Engineering, Restructuring, Client/Server Software Engineering, Computer Aided Software Engineering, Advances & Future Scope in Software Engineering.

REFERENCES:

1. .Pressman, Roger, "Software Engineering- A Practitioners Approach", McGraw Hill
2. S.L. Pfleeger, "Software Engineering- Theory & Practice", Pearson Education
3. Gheezi, Jazayeri Et Al, "Fundamentals Of Software Engineering", PHI
4. Ian Sommerville, "Software Engineering", Pearson Education
5. PankajJalote, "An Integrated Approach To Software Engineering", Narosa
6. Hans Van Vliet, "Software Engineering- Principles & Practice", Wiley

Course No.: MIT-2T4-C
Course Title: Computer Organization and Architecture

UNIT I

Evolution & interpretation of the concept of Computer Architecture at different levels of abstraction. The concept of Computer Architecture at Multilevel Hierarchical Framework. Register Organization. Interconnection Structures, Bus Interconnections, Integer/Floating Point Arithmetic & Representation, Instruction Cycle & Interrupts. Instruction Set Characteristics & Functions. Addressing Modes & Formats.

UNIT II

Processor Organization: ALU, Design of Arithmetic Circuit, Design of Logic Circuit & Design of ALU. Processor Unit: Design of Accumulator. Control Organization: Hardwired / Micro-Programmed Control, Control Memory, Address Sequencing, Design of Control Unit & Micro-Program Examples.

UNIT III

Memory Hierarchy, Main Memory: RAM/ROM Chips. Memory Address Map, Memory Connection to CPU, Associative Memory, Hardware Organization – Match Logic, Read/Write Operation, Cache Memory, Virtual Memory, Memory Management – Associated Hardware, I/O Organization. Peripheral Devices: I/O Interfaces, Asynchronous Data Transfer, Modes of Transfer, Direct Memory Access & I/O Processor.

UNIT IV

RISC Architectures – their characteristics & comparison to CISC, Introduction to Parallel Processing, Basic Parallelization Techniques. Pipelining – Arithmetic & Instruction Pipelining, RISC Pipeline, Vector & Array Processors. Multiprocessor System Architectures & their Characteristics, Interconnection Structures, Inter-processor Arbitration, Inter-processor Communication & Synchronization, Cache Coherence Issues. Introduction to Super Scalar Processors

REFERENCES:

1. V.C. Hamacher, A.G. Vranesic& S.G. Zaky, “Computer Organization”, Tata McGraw Hill
2. J.P Hayes, “Computer Architecture & Organization”, Tata Mcgraw Hill
3. Morris Mano, “Computer System Architecture”, PHI.
4. W. Stallings, “computer organization and architecture”.
5. M. J. Flynn, “Computer Architecture”, Narosa
6. David A. Patterson, John L. Hannessey, ” Computer Organization”
7. GovaindaRajalu, “Computer Architecture & Design ” TMH

Course No.: MIT-2E1-DCE
Course Title: Operational Research

UNIT I

Linear Programming: L P formulation, Graphical methods for LPP with 2 variables, Simplex Algorithm Duality theorem in linear programming and applications. Transportation problem: Formulation, methods of selecting initial feasible solutions, Degeneracy and resolution. Assignment problem: Balanced and Unbalanced problems and resolution.

UNIT II

Network Analysis: Shortest routes, Enumeration and applications. Max flow problem, Min Cut and max-flow min-cut theorems. PERT & CPM: Use and design of PERT and CPM, critical path calculation. Dynamic Programming: Characteristics of dynamic programming problem, Bellman's optimality principles, dynamic programming under certainty, shortest route problem.

UNIT III

Game theory: definition and explanation, saddle points, Dominance mixed strategies, games without saddle points, 2*N games. Replacement and Sequencing models: Replacement of items that fail and deteriorate. Group & individual replacement. Sequencing problems, Johnsons algorithm for processing m jobs through 2 , 3 and n machines, Inventory models: introduction to inventory problems and their analytical structure.

REFERENCES:

1. Hamdy A. Taha, "Operations Research: An Introduction", Pearson
2. Sharma J. K., "Operations Research: Theory and Applications", Macmillan India
3. Gross Donald, "Fundamentals of Queuing Theory", 3rd Ed., John Wiley
4. Mokhtar S. Bazaraa, "Linear Programming and Network Flows", John Wiley
5. Hiller Lieberman, "Introduction to Operations Research", TMH
6. Laudon, "Decsion Support Systems", PHI
7. Davis Olson, "Management Infromation Systems", TMH
8. N.D.Vohra, "Quatitative Techniques in management", TMH

Course No.: MIT-2E2-DCE
Course Title: Open Source Technologies

UNIT 1

Overview of Open Source Software. Need of Open Sources –Advantages of Open sources – Applications- Licensing, Certification , Comparison with close source / Proprietary software , Free Software . Open source vs source available, Widely used open source software licenses : Apache License, BSD license, GNU General Public License, GNU Lesser General Public License, MIT License, Eclipse Public License.

UNIT 2

Open Source OS : Installation of Linux (Redhat-CentOS): Theory about Multiboot Environment, Command Line: Basic File System Management Task, Understanding FHS of Linux. Overview of other OS : Ubuntu and Ubuntu Server. Mobile OS : Android , overview and architecture.

Open Source Languages and Web Servers : Overview of PHP, Basic syntax and usage. Python programming language basics, JQuery.

Open Source Web servers: Installation, configuration and administration of Apache, Nginx.

UNIT 3

Open Source Tools , IDE, RDBMS:

Eclipse IDE , OpenStack cloud technology, Version Control Systems , GIT , CVS.

Open Source Repositories : GitHub, SourceForge, Google Code.

Open Source RDBMS: MySQL basics, installation and usage.

PostgreSQL,NoSQL, MongoDB, Hadoop.

REFERENCES:

1. Understanding Open Source and Free Software Licensing - By Andrew M. St. Laurent,
2. Oreily Media.
3. Apache HTTP Server Documentation Version 2.2 by byApache Software Foundation
4. MySQL 5.5 Reference Manual (Chapter 2 and 3 of manual) (e-Resource)
5. The Complete Guide to Linux System Administration by Nicholas Wells, CengageLearning.

Course No.: MIT-2E3-DCE
Course Title: Information Systems

UNIT I

Introduction to System Theory: Types of Systems; Concepts of Data, Information, Knowledge & Intelligence; Attributes of Information. Information Systems: Basic Concepts & framework. Evolution of Information Systems, Role of Information Systems, Dimensions & Categories of Information Systems, Contemporary Approaches to Information Systems; Technical, Behavioral & Socio-technical Understanding of Information .

UNIT II

Management Information Systems: Introduction, Concepts & framework. Fundamental Types of Management Information Systems, Organization and Information systems, Managerial Decision Making Process, Organizational Information systems. Information Processing: Storage and Processing tools, Data & File Environment, Database Systems, Database management systems & database services.

UNIT III

Decision Support Systems: Overview, Concepts, Characteristics, Capabilities, Components & Classification. Relevance of Relational Database Management Systems in DSS, DSS design, tools, construction and Generators. Design identification and building of DGMS.MBMS: Model types, Dichotomous Model of mind and Simons Model. Introduction to Expert system and Executive support system

REFERENCES:

1. Laudon, "Management Information Systems", Pearson
2. Jawadekar, "Management Infromation Systems",
3. Kroenke, Management Information Systems", Mc-Graw Hill.
4. Mudrick R.G., Ross, J.E. &Gleggt, J.R."Information Systems for Modern Management", PHI.
5. Jayashankar: Decision Support Systems, Mc-Graw Hill.
6. Stephen Haag and Maeve Cummings, "Information Systems Essentials", McGraw-Hill
7. Ralph Stair, "Principles of Information Systems", ISBN: 0619064897

Course No.: MIT-2E4-DCE
Course Title: Green Technologies

UNIT I

Wind: basic concepts, sources and uses of wind, scientific principles of wind, Energy concept: kinetic energy, electromagnetism, wind turbine technology, Electricity concept: production, transmission, storage and uses of wind electricity, Hydroelectric and fuel cells: sources and uses, production, transmission ,storage and uses of hydroelectric and fuel cell electricity, small hydropower systems

UNIT II

Solar energy: basic concepts, sources and uses, energy concept: reflection, absorption and concentration of solar energy, introduction to photovoltaics, types of photovoltaic systems, solar cells and solar modules. Green management, nuclear energy

UNIT III

Biomass: concepts, sources and uses, biofuel, heat energy, production and transmission of biomass electricity, Energy conversion, basics of ecology and environment, natural resources, global environment issues and environment risk management, recycling. Concept of ecological footprints.

REFERENCES:

1. Foundation of Green IT: Marty Poniatowski
2. Powering the dream: the history and promise of green technology: Alexix Madrigal
3. Understanding photovoltaics: jay warmke
4. Green technology-Earth friendly innovations:Geetha Sobha