Department of Computer Science
Islamic University of Science & Technology

Credit Based Choice Based Curriculum for

Master of Science in Information Technology (M.Sc. IT) Programme 2018-2020 Onwards

CBCS Course Outline M. Sc(IT)

Semester-I (24 Credit Semester)						
Course Code	**Course Name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
18 Core Credit Units						
MIT-1T1-C	Programming Concepts in C and C++	Core	2	1	4	5
MIT-1T2-C	Database Management System	Core	2	1	4	5
MIT-1T3-C	Discrete Mathematics	Core	4	0	0	4
MIT-1T4-C	Technical Communication	Core	4	0	0	4
6 Elective Credit Units						
MIT-1E1-DCE	Digital Electronics	DCE	3	0	0	3
MIT-1E2-DCE	E-commerce	DCE	3		0	3
MIT-1E3-DCE	Fundamentals of IT	DCE	3	0	0	3

Semester-II(24 Credit Semester)						
Course Code	**Course Name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
18 Core Credit Units						
MIT-2T1-C	Data Structures	Core	2	1	4	5
MIT-2T2-C	Computer Graphics	Core	2	1	4	5
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 Data Analysis Technologies	DCE	2	1	0	3
MIT-2E3-DCE	Information Systems	DCE	3	0	0	3
MIT-2E4-DCE	Elements of Business Management	DCE	3	0	0	3

Semester-III(26 Credit Semester)						
Course Code	**Course Name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
18 Core Credit Units						
MIT-3T1-C	Java Programming	Core	2	1	4	5
MIT-3T2-C	Design and Analysis of Algorithms	Core	2	1	4	5
MIT-3T3-C	Data Communication and Computer Networks	Core	4	0	0	4
MIT-3T4-C	Operating System	Core	4	0	0	4
6 Elective Credit Units						
MIT-3E1-DCE	Programming Languages and Paradigms	DCE	3	0	0	3
MIT-3E2-DCE	Open Source Web Technologies	DCE	2	1	0	3
MIT-3E3-DCE	Soft Computing	DCE	3	0	0	3
MIT-3E4-DCE	Parallel and Distributed Computing	DCE	3	0	0	3
MIT-3E5-DCE	Multimedia & Image Authoring	DCE	2	1	0	3
MIT-3E6-DCE	Wireless Communication.	DCE	3	0	0	3
2 credit units to be taken from outside departments						

Semester-IV(26 Credit Semester)						
Course Code	**Course Name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
20 Core Credit Units						
MIT-4T1-C	Research Methodologies	Core	4	0	0	4
MIT-4T2-C	Theory of Computation & Formal Languages	Core	4	0	0	4
MIT-4T3-C	Major Project Work	Core				10
6 Elective Credit Units						
MIT-4E1-DCE	Bio Informatics	DCE	3	0	0	3
MIT-4E2-DCE	Cloud and Grid Computing	DCE	3	0	0	3
MIT-4E3-DCE	Information Security and Networks	DCE	3	0	0	3
MIT-4E4-DCE	Pattern Recognition	DCE	2	1	0	3
MIT-4E5-DCE	Data Warehousing	DCE	3	0	0	3
MIT-4E6-DCE	Organizational Behaviour	DCE	3	0	0	3
MIT-4E7-DCE	Machine Learning.	DCE	3	0	0	3
MIT-4E8-DCE	Dot Net	DCE	2	1	0	3
MIT-4E9-DCE	Data Mining	DCE	3	0	0	3
MIT-4E10-DCE	Advanced Java	DCE	3	0	0	3
2 credit units to be taken from outside departments						

Semester - I

Semester-I (24 Credit Semester)						
Course Code	**Course Name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
18 Core Credit Units						
MIT-1T1-C	Programming Concepts in C and C++	Core	2	1	4	5
MIT-1T2-C	Database Management System	Core	2	1	4	5
MIT-1T3-C	Discrete Mathematics	Core	4	0	0	4
MIT-1T4-C	Technical Communication	Core	4	0	0	4
6 Elective Credit Units						
MIT-1E1-DCE	Digital Electronics	DCE	3	0	0	3
MIT-1E2-DCE	E-commerce	DCE	3	0	0	3
MIT-1E3-DCE	Fundamentals of IT	DCE	3	0	0	3

Course Title: Programming Concepts in C and C++
Course Code: MIT-1T1-C

COURSE STRUCTURE:
Paper: Core **Credits:** 5
Max Marks: 125 (**Mid Term:** 30, **End Term:** 50, **Lab:** 25, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.
- Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms.
- To practice the fundamental programming methodologies in the C/C++ programming language via laboratory experiences.
- To code, document, test, and implement a well-structured, robust computer program using the C/C++ programming language.
- Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.
- Demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.

COURSE CONTENT:

Unit I

C programming language: Evolution, Features & Importance. Basic Structure of C programs, Character Set, Identifiers, Reserved Words, Data Types, Constants, Variables, Symbolic Constants, Casting and Standard Libraries. Logical and Control Structures: Assignment, Arithmetic, Relational, Logical, Compound, Increment, Decrement, Bitwise Operators & Special Operators.IF, IF – ELSE, Nested IF – ELSE, ?: , SWITCH CASE. Looping Constructs: FOR, WHILE, DO-WHILE, EXIT, BREAK, CONTINUE

Arrays: Types of arrays, Initialization, dynamic arrays. Character Arrays & Strings. String-handling functions.

Unit II

Functions: Concepts, Elements, Prototypes & Types. Passing Arrays to Functions.Storage classes, Recursion. Command-line arguments. Multifile programming. Preprocessing.

Pointers: Concepts, Variables, swapping data, swapping address v/s data, pointers & arrays, pointers to pointers, pointer to strings, pointer arithmetic, additional operators, pointers to functions, void pointers.Structures and Unions: Syntax & use, members, structures & pointers, array of structures, structures & functions, structure within structures.

Unit III

OOPS: Evolution and need of C++, Advantages over Procedural programming

Introduction to classes and objects, Basic OOPS programming

C++ Functions: passing arguments to functions, returning values from functions, reference arguments, inline functions, default arguments, object as function argument, returning objects from functions. Constructors and Destructors, Copy Constructors

Unit IV

Inheritance and Polymorphism: Inheritance and types, Polymorphism (static and dynamic), function overloading, function overriding, virtual functions & operator overloading.

Files: File processing in C & C++. Templates: Concepts, Function & Class templates,

TEXT BOOKS:

1. Programming in ANSI C 6th Edition "E. Balaguruswamy"
2. Object Oriented Programming with C++ " E. Balagurusamy"
3. Herbert Schildt, "C++ The Complete Reference", Tata McGraw Hill

REFERENCES:

1. Dennis Richie & Kernighan, "C Programming Language", Prentice Hall
2. Dietel & Dietel, "How to program", Pearson Education
3. Robert Lafore, "Object Orientation with C++ Programming", Waite Grou
4. Programming and Problem Solving by M. Sprankle, Pearson Education

Course Title: Database Management System
Course Code: MIT-1T2-C

COURSE STRUCTURE:
Paper: Core **Credits:** 5
Max Marks: 125 (**Mid Term:** 30, **End Term:** 50, **Lab:** 25, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- To understand the role of a database management system in an Organization.
- To understand basic database concepts, including the structure and Operation of the relational data model.
- To construct simple and moderately advanced database queries using Structured Query Language (SQL).
- To understand and successfully apply logical database design principles, including E-R diagrams and database normalization.

COURSE CONTENT:

UNIT I

Basic Concepts & Conceptual Database Design: Database Users, Characteristics of the Database, Advantage of using Database Systems, Data Models, schemas & instances, Three Tier Architecture & Data Independence, Database Languages & Interfaces. Overview of Legacy Data Base Management Systems. Data Modeling Using The Entity-Relationship Model – Entities, Attributes & Relationships, Cardinality of Relationships, Strong & Weak Entity Sets, Translating your ER Model into Relational Model.

UNIT II

Relational Model, Languages & Systems: Relational Data Model, Relational Model Concepts, Relational Model Constraints, Relational Algebra, SQL – A Relational Database Language, Data Definition &Manipulation in SQL, Queries in SQL, Specifying Constraints in SQL, Practicing SQL commands using ORACLE. PL/SQL, Stored Procedures", cursors and triggers.

UNIT III

Functional Dependencies & Normalization for Relational Databases: Functional Dependencies, canonical cover of function dependencies, Joins, Armstrong rules, Normal Forms based on primary keys, General Definitions of Second & Third Normal Forms, Boyce-Codd Normal Form, and Multivalued Dependencies.

UNIT IV

Transaction Management: Transaction Concept & State, Desirable Properties of a Transaction, Characterizing Schedules based on Serializability& Recoverability, Concurrency Control Techniques: Lock-Based Protocols, Timestamp-based Protocols, and Validation–based Protocols. Database Recovery Techniques: Recovery Concepts, Recovery based on Deferred Update & Immediate Update. Shadow Paging. Overview of Object Oriented Database Management Systems.

TEXT BOOKS

1. Fundamentals of database systems / Ramez Elmasri, Shamkant B. Navathe.—6th ed.

REFERENCES:

1. Korth, Silberschatz, “Database System Concepts”, TMH
2. Steve Bobrowski, “Oracle 8 Architecture”, TMH
3. Date C. J., “An Introduction to Database Systems”,Narosa Publishing
4. Elmsari & Navathe, “Fundamentals of Database Systmes”, A. Wesley
5. Ullman J. D., “Principles of Database Systems”, Galgotia Publications
6. William Page, “Using Oracle 8i – Special Edition”, Que/PHI
7. Ivan Bayross, ”SQL & PL/SQL Using Oracle 8i & 9i with SQLJ”, BPB
8. Desai.B, "An introduction to Database Concepts", Galgotia Publications

Course Title: Discrete Mathematics
Course Code: MIT-1T3-C

COURSE STRUCTURE:
Paper: Core **Credits:** 4
Max Marks: 100 (**Mid Term:** 30, **End Term:** 50, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- To familiarize students about set theory concepts, operations and uses in computer sciences.
- To explain concept of Discrete Structures which include Semigroups, Monoids, and Groups together with their uses in computer science and their corresponding structures in computer science.
- To explain students concepts like Partially Ordered Sets, Lattices and Finite Boolean Algebra and use in Computer Science.
- Give student a knowledge about finite state Machines and possible modeling of process using finite state Machine concepts.

COURSE CONTENT:

UNIT I

Sets: Review of set concepts & operations on sets. Functions: Domain, Range, One-to-One, Onto, Inverses & Composition, One-to-One Correspondence & the Cardinality of a Set, sequences & summations, the growth of functions. Methods of Proof: Different methods of proof, Direct Proof, Indirect Proof, Mathematical Induction for proving algorithms. Propositions & logical operations, Notation, Connections, Normal forms & Truth Tables. Equivalence & Implications. Theory of inference for statement calculus, Predicate calculus, Quantifiers, Rules of Logic.

UNIT II

Principles of counting: The Principle of Inclusion-Exclusion, Applications of inclusion-exclusion principle, The Addition & Multiplication Rules, The Pigeon-Hole Principle . Permutation & combinations. Relations & digraphs, Properties of relations, Binary Relations, Equivalence relations, Matrix representation of relations & digraphs, Computer representation of relations & digraphs, Recurrence relations & Manipulation of relations.

UNIT III

Partially Ordered Sets (Posets), External elements of partially ordered sets. Lattices. Finite Boolean algebra, Function on Boolean algebra's, Boolean functions as Boolean polynomials.

Groups & applications: Monoids, semigroups, Product & quotients of algebraic structures, Isomorphism, homomorphism, automorphism, Normal subgroups, Codes & group codes.

UNIT IV

Overview of Formal Languages: Representation of special languages & grammars, finite state machines. Graph theory: Definition, paths, circuits, reachability, connectedness. Matrix representation of graphs, trees, tree traversal, trees & sorting, spanning trees, minimal spanning trees, , "B+ Trees, Red-Black Trees Catalans Series(numbers), Transitive closure, Warshall's Algorithms, Eularian& Hamiltonian graphs, graph coloring, Storage representations of graphs.

TEXT BOOKS:

1. Kolman, Bernard, Robert C. Busby, and Sharon Cutler Ross. Discrete mathematical structures. Prentice-Hall, Inc., 2003.

REFERENCES:

1. KENNETH H. ROSEN "Discrete Mathematics & Its Applications" The Random House/Birkhauser Mathematics series
2. LIU "Elements of Discrete Mathematics " Tata McGraw Hill
3. SCHAUMS "Discrete Mathematics" Tata McGraw Hill
4. KOLMAN/REHMAN "Discrete Mathematical Structures" Pearson Education
5. NICODEMI "Discrete Mathematics" CBS

Course Title: Technical Communication
Course Code: MIT-1T4-C

COURSE STRUCTURE:
Paper: Core **Credits:** 4
Max Marks: 100 (**Mid Term:** 30, **End Term:** 50, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- The objective of studying Technical Communication course is that it enhances the employability skills and performance at workplace. It provides discussion on modern media tools for enriching presentation skills for preparing PowerPoint slides. Thus acts as a reference for training programs offered by business houses and Industries.

COURSE CONTENT:

UNIT I

Technical Communication: Basics of Technical Communication, Barriers to communication and Technology in Communication. Communication in the Workplace: Problem Solving in Workplace Communication, Human factors in the communication failure. Guidelines for ethical communication. Active Listening: Introduction, types of listening, traits of a good listener, Active vs. Passive listening and implications of good listening.

UNIT II

Introduction to Effective Presentation strategies: defining purpose, analysing audience and locale, organizing contents, preparing outline, visual aids, understanding nuances of delivery, kinesics, proxemics, paralinguistic, chromatics. Interviews: introduction, objectives, types of interviews and job interviews, guidelines for surviving a job interview. Group Communication: Introduction, Group discussion, Organizational Group discussions and meeting conferences.

UNIT III

Paragraph Development: Central Components of a paragraph, length of a paragraph ad techniques for paragraph development. The art of condensation, steps for effective précis writing, samples and guidelines.

Reading Comprehension, purpose and reading rate, reasons for poor comprehension, improving comprehension skills, techniques for good comprehension. Memo reports: Purpose of memo reports, elements of a usable

memo, interpersonal considerations in writing a memo, common types of memo report.

UNIT IV

Letters and Employment correspondence: Application letters and business correspondence, How applicants are screened for personal qualities, electronic job Hunting. Technical Proposals: Definition, purposes, Types, Characteristics, elements of structure, style and Appearance, evaluation.

Research paper: Introduction, Research paper, Dissertation, Thesis.

TEXT BOOKS:

1. Technical Communication 8th Edition
2. Technical Communication2nd Edition Publisher:Irwin McGraw Hill 2000.
3. Technical Communicatio:Process and Product 9th Edition by Shareson J.Gerson, Steven M.Gerson.

REFERENCES:

1. Meenakshi Raman & Sangeeta Sharma,"Technical Communication",Oxford University Press
2. William Pfeiffer, Padmaja,"Technical Communication A Practical Approach", Pearson Education.

Course Title: Digital Electronics
Course Code: MIT-1E1-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To have the basic understating of data representation & to Perform decimal, octal, hexadecimal, and binary conversion
- To get the fundamental understating of sequential and digital circuits
- To understand the concept minimum Boolean expression and its impact on digital circuits
- To understand the basics of flip flops being used in registers and counters

COURSE CONTENT:

UNIT I

Introduction to Digital Systems, Number systems: Binary number system, Octal & Hexa-decimal number system, Conversion of Number System, Arithmetic operations on Binary numbers, Number representation: Signed Binary numbers, 1's and 2's Complement. Fixed and Floating Point Representation. Logic Gates: AND, OR, NOT NOR, NAND & XOR & their Truth tables Logic diagrams. Boolean expression and construction of truth tables

UNIT I

Minimization of Boolean Expression: Introduction, Boolean algebra Law's, and De-Morgan's theorem, Sum of Product & Product of Sum and standard forms, K –Map & Do Not Care Conditions. Error Detection and Correction: single parity and block parity check, hamming code, Combinational Logic: Introduction, Adders, parallel binary adders and carry methods, Sub tractors, Multiplexers, De-multiplexers, Decoders & Encoders.

UNIT III

Sequential Logic - Definition & Basic sequential circuits, Latches & Flip-flops: SR-Flip Flop, D-Flip Flop, JK flip-flop, T flip-flop, Race condition, JK Master Slave Flipflop, Timing Specifications, Counters: Basics of Asynchronous & Synchronous counters, Registers , Shift Registers, Types of Shift registers.

TEXT BOOKS:

1. Digital Fundamentals, Floyd and Jain, 8th Edition Pearson Education.

REFERENCES:

1. Digital Fundamentals, Global Edition (Kindle Edition) by Thomas L Floyd.
2. Modern Digital Electronics, 3rd Edition by R.P Jain
3. Digital Electronics: principles, Devices & Applications, Wiley by Anil K Maini.

Course Title: E-Commerce

Course Code: MIT-1E2-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3

Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVE:

- This course introduces the concepts, vocabulary, and procedures associated with E-Commerce and the Internet. This course will help students to understand basic knowledge, primary theories and basic operational framework required to perform business or commerce through internet. In this subject students will also learn about different key aspects that are necessary for establishing an e-commerce portal. The course further aims to impart students with various practices required for unveiling e-commerce like market strategies, product management, service orientation, supply chain management, customer relationship management, electric payments, security and marketplaces.

COURSE CONTENT:

UNIT I

E-Commerce (Introduction & Definition), Goals of E-Commerce, Technical Components, Functions, Advantages & Disadvantages, Applications

The Internet & WWW - Evolution of Internet, Domain Names & Internet Organization (.edu , .com , .mil .gov ,.net etc), Internet Service provider.

UNIT II

E commerce business models: key elements of business model, Business to Consumer(B2C) model, B2B model, consumer to consumer model(C2C).Building E commerce- system development life cycle, choosing software & hardware e commerce, site tools. Benefits of website, Registering a Domain Name, Web promotion. Internet Security , Secure Transaction, Computer Crime (Types of Crimes), Threats.

UNIT III

Electronic Data Interchange, Introduction, Concepts of EDI & Limitation, Application of EDI, Disadvantages of EDI, EDI model, Electronic payment System, Introduction, Types, Strategies for developing electronic commerce web sites, Net marketplaces- characteristics of net marketplaces, types of net marketplaces, E distributors, E procurement, Exchanges. Online content providers- digital copyrights & electronic publishing

TEXT BOOKS:

1. E commerce: by Kenneth C. Laudon

REFERENCES:

1. E-Commerce Concepts , Models , Strategies by G.S.V Murthy
2. E-Commerce by Kamlesh K Bajaj &Debjani Nag
3. Electronic Commerce by Gary P. Schneider
4. E commerce: by Laudon

Course Title: Fundamentals of IT
Course Code: MIT-1E3-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVE:

- The course introduces the students to basic computer concepts. Emphasis of the course is on providing the students with an introduction to computers, overview of computer software, data communication- tools and techniques, fundamentals of networking and network protocols. The course also introduces the students to current trends in information technology.

COURSE CONTENT:

UNIT I

Introduction to computers, characteristics of computers, generations and types of computers, block diagram of computer system.Input and output devices, storage devices. Booting process. Hardware and Software concept. Firmware.

UNIT II

Programming Language classifications: Machine language, assembly language and high level language. Translators,compilers, interpreters and assemblers.Operating system -features, functions and types of OS.Data communication: Definition, criteria, process of communication, types of computer networks. Concept of LAN, MAN and WAN.

UNIT III

Transmission media: guided and unguided media. Internet basics, internet protocols, browsers, WWW, email, Telnet, FTP, benefits of Internet and Limitations. Latest IT trends-Electronic E conferencing and Teleconferencing, E commerce, AI(Artificial Intelligence), Geographic information system(GIS). Roleof IT in different areas-Education, industry, banking, marketing.

TEXTBOOKS:

1. P. K. Sinha, “Computer Fundamentals, 2005”, BPB, New Delhi.

REFERENCES:

1. V. RajaRaman, ”Introduction to computers”, TMH
2. Peter Norton, “Introduction to computers”, TMH

Semester - II

Semester-II(26 Credit Semester)						
Course Code	**Course Name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
18 Core Credit Units						
MIT-2T1-C	Data Structures	Core	2	1	4	5
MIT-2T2-C	Computer Graphics	Core	2	1	4	5
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 Data Analysis Technologies	DCE	2	1	0	3
MIT-2E3-DCE	Information Systems	DCE	3	0	0	3
MIT-2E4-DCE	Elements of Business Management	DCE	3	0	0	3
2 credit units to be taken from outside departments						

Course Title: Data Structures
Course Code: MIT-2T1-C

COURSE STRUCTURE:
Paper: Core **Credits:** 5
Max Marks: 125 (**Mid Term:** 30, **End Term:** 50, **Lab:** 25, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVE:

- The objective of this course is to introduce the students to the significant topics of basic as well as advanced data structures and subsequently make them understand & learn the commonly used data structures along with their applications. The focus is also to appreciate the need and working of different ways of storing data and demonstrate the advantages and disadvantages of specific data structures both linear as well as non-linear. The course emphasizes on lab work wherein the students learn not only to make use of different data structures, but also their application in different synthetic problems. The practical demonstration for autonomous realization of simple programs or program parts is to understand the behavior of these basic data structures and to have a thorough understanding of how data structures influence the performance of algorithms.

COURSE CONTENT:

UNIT I

Data Structures: Overview & Significance. Introduction & Analysis of Algorithms. Linear & Non Linear Data Structures. Array & Strings, Application of Arrays, Sparse Matrix, Searching & Sorting: Linear & Binary Search, Bubble Sort, Selection Sort & Insertion Sort. Recursion & Applications.

UNIT II

Stack: Operations & Applications, Polish Expressions
Queue: Operations & Applications, Circular Queue: Operations & Applications.
Linked List: Singly Linked List, Doubly Linked List, Circular Linked List. Linked implementation of Stack & Queue, Operations & Applications of Linked Lists.

UNIT III

Trees: Basic Concept, Terminology & Representation of a Tree. Binary Tree, Binary Search Tree, Tree Traversal Techniques, BST Sort, AVL Trees, Heap Sort, Quick Sort, Merge Sort. Threaded Binary Tree, Red Black Trees, B Trees, B* Trees, Applications of Trees.

UNIT IV

Graph: Matrix & List Representation, Elementary Graph Operations (BFS & DFS), Single Source Shortest Path, Dijkstras Algorithm, Bellman-Ford Algorithm. All Pair Shortest Paths, Transitive Closer, Floyd-Warshall Algorithm. Spanning Trees: Minimum Cost Spanning Trees, Prims & Kruskal Algorithm. Hashing: Overview, Hashing Functions, Collision Resolution Techniques.

TEXT BOOKS:

1. Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Ed.

REFERENCE BOOKS:

1. Data structures and Algorithms in C++ -- by Adam Drozdek (1994 2001).
2. Fundamentals of Data Structures in C -- by Horowitz, Sahni and Anderson-Freed (Silicon Press 2007).
3. Data Structure Using C and C++ -- by Y. Langsam, M. J. Augenstein and A. N. Tanenbaum (Pearson Education, 2nd Edition, 2015).

Course Title: Computer Graphics
Course Code: MIT-2T2-C

COURSE STRUCTURE:
Paper: Core **Credits:** 5
Max Marks: 125 (**Mid Term:** 30, **End Term:** 50, **Lab:** 25, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- To explain basic primitives like Point, Line, Circle, Ellipse etc. with their mathematical equations coupled with the geometrical interpretations.
- To explain process of displaying continuous primitives on Discrete Display Devices.
- To explain few transformations like Translation, Rotation, Scaling and composition of these transformations.
- To explain Projections from higher dimensional setup to lower dimensions.
- To explain drawing of complex scenes using Splines coupled with understanding of spline specifications and few variants of splines besides familiarizing about Beziers.
- To acquaint students about Concepts of displaying structures with no inherent regular geometry using Fractals.

COURSE CONTENT:

UNIT I

An Introduction Graphics System: Computer Graphics & Its Types, Application of computer graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Display Buffer, Concept of Double Buffering & Segmentation of Display Buffer. Use of Lookup tablestables "Introduction to Color models (RGB, CMY, and HSV)."

UNIT II

Output Primitives & Attributes of Output Primitives: Output Primitives Points & Lines, Line Drawing Algorithms, Circle Generating Algorithms, Scan-Line Polygon Fill Algorithm, Inside-Outside tests, Boundary-Fill Algorithm, Flood Fill Algorithm, Cell Array, Character Generation, Attributes of Output Primitives: Line attributes, Color & Grayscale Levels, Area fill Attributes, Character Attributes, Bundled Attributes. Anti-aliasing.

UNIT III

Two-dimensional Geometric Transformations: Basic Transformations, Matrix Representations & Homogeneous Coordinates, Composite Transformations, Reflection & Shearing
Two-Dimension Viewing: The viewing Pipeline, Window to view port coordinate transformation, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping, Text Clipping, Exterior Clipping

Three–Dimensional Concepts: Three Dimensional Display Methods, 3D Transformations, Parallel Projection & Perspective Projection

UNIT IV

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

Introduction to Graphics Packages: graphics.py v5 (Overview,GraphWinObjects,Graphics Objects, point Methods, line Methods, Circle Methods,RectangleMethods,Oval,polygon,text Methods, Displaying Images, Entry Objects, Generating Colors)

TEXT BOOKS:

1. Hughes, John F., et al. Computer graphics: principles and practice. Pearson Education, 2014.

REFERENCES:

1. W.M.Newman & Sproull. “Principles of interactive Computer Graphics” ,TMH
2. Steven Harrington.” Computer Graphics a Programming Approach” McGraw Hill.
3. Plastock & Kelley. “Schaums outline of theory & problems of computer Graphics”
4. David F Frogers & J Alan Adams. “Procedural Elements of Computer Graphics” McGraw Hill
5. David F Rogers & J Alan Adams. “Mathematical Elements of Computer Graphics” McGraw Hill

Course Title: Software Engineering
Course Code: MIT-2T3-C

COURSE STRUCTURE:
Paper: Core **Credits:** 4
Max Marks: 100 (**Mid Term:** 30, **End Term:** 50, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- To familiarize students with the fundamentals of software engineering.
- To introduce students to the basic concepts and principles of structured software engineering.
- To make students understand the software management issues.
- To introduce the students to the basic concepts of OOSE.
- To study advanced concepts in software engineering like Reverse engineering, Reengineering, etc.

COURSE CONTENT:

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, & 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.

TEXT BOOKS:

1. Pressman, Roger, “Software Engineering- A Practitioners Approach”, McGraw Hill

REFERENCES:

1. Gheezi, Jazayeri Et Al, “Fundamentals Of Software Engineering”, PHI
2. Ian Sommerville, “Software Engineering”, Pearson Education
3. PankajJalote, “An Integrated Approach To Software Engineering”,Narosa
4. Peters & Pedrycz, “Software Engineering an Engineering Approach”, Wiley

Course Title: Computer Organization & Architecture
Course Code: MIT-2T4-C

COURSE STRUCTURE:
Paper: Core **Credits:** 4
Max Marks: 100 (**Mid Term:** 30, **End Term:** 50, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- To know and understand the main components of a computer system and the considerations in their design.
- To acquire tools for comparison among alternatives.
- To know and understand performance measures, as well as their impact on system architecture.
- To understand the interplay among system components, design trade-offs, etc.
- To understand the interplay among system components, design trade-offs, etc.

COURSE CONTENT:

UNIT I

Fundamental concepts of computer architecture & organization, 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

TEXT BOOKS:

1. W. Stallings, “computer organization & architecture”.
2. Morris Mano, “Computer System Architecture”, PHI.
3. Walter A. Triebel, Avtar Singh“The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, and Applications”, Prentice Hall

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. M. J. Flynn, “Computer Architecture”, Narosa
4. David A. Patterson, John L. Hannessey, ” Computer Organization”
5. Govainda Rajalu, “Computer Architecture & Design” TMH

Course Title: Operational Research
Course Code: MIT-2E1-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To identify and develop operational research models from the verbal description of the real system.
- To understand the mathematical tools that are needed to solve optimisation problems.
- To define and formulate linear programming problems and appreciate their limitations.
- To understand how to solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
- To conduct and interpret post-optimal and sensitivity analysis and explain the primal-dual relationship.
- To develop mathematical skills to analyse and solve integer programming and network models arising from a wide range of applications.

COURSE CONTENT:

UNIT I

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

UNIT II

Network Analysis: Shortest routes, Enumeration& applications. Max flow problem, Min Cut & max-flow min-cut theorems. PERT & CPM: Use & design of PERT & 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 & explanation, saddle points, Dominance mixed strategies, games without saddle points, 2*N games. Replacement & Sequencing models: Replacement of items that fail & deteriorate. Group & individual replacement. Sequencing problems, Johnsons algorithm for processing m jobs through 2 , 3 & n machines, Inventory models: introduction to inventory problems & their analytical structure.

TEXT BOOKS:

1. N.D.Vohra, “Quatitative Techniques in management”, TMH
2. Hamdy A. Taha, “Operations Research: An Introduction”, Pearson

REFERENCES:

1. Sharma J. K., “Operations Research: Theory & Applications”, Macmillan India
2. Gross Donald, “Fundamentals of Queuing Theory”, 3rd Ed., John Wiley
3. Mokhtar S. Bazaraa, “Linear Programming & Network Flows”, John Wiley
4. Hiller Lieberman, “Introduction to Operations Research”, TMH
5. Laudon, “Decsion Support Systems”, PHI

Course Title: Open Source Data Analysis Technologies
Course Code: MIT-2E2-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To learn about licensing in Open source.
- To know about Version Control Systems.
- To learn Python Language and its use in data sciences.

COURSE CONTENT:

UNIT I

Open Source Licensing: 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.

Introduction to Version control System. Introduction to GIT(dvcs), setting up a repository (GITHUB, BITBUCKET), adding files, deleting files, commit, push, pull, branching, merging.

UNIT II

Introduction to python: Rapid Introduction to Procedural Programming, data types ,collection ,control structures & functions ,modules, object oriented programming, file handling,advanced programming techniques.

UNIT III

Python for data Analysis: Introduction to NumPy – Ndarray, Basic operations, Indexing, Slicing, iterating, conditions & boolean arrays, shape manipulation, array manipulation. Pandas library – introduction, series, dataframe, operations, sorting, reading & writing data. Matplotlib introduction.

TEXT BOOKS:

1. Python Data Analytics: by Fabio Nelli Publisher: Apr Release Date: August 2015 ISBN: 9781484209585
2. Programming in Python 3:A complete introduction to Python Language, Second Edition by Mark Summerfield Addison -Wesley Professional
3. Understanding Open Source & Free Software Licensing - By andrew M. St. Laurent, Oreily Media.

REFERENCES:

1. Learning Python by Mark Lutz and David Ascher
2. Python Cookbook by David Beazley and Brian K. Jones

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

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- Understand the leadership role of Information Systems in achieving business competitive advantage through informed decision-making
- Interrelate how various support *systems* can be used for business decisions and to sustain competitive advantage.
- Role of information technology and information systems in business .
- Record the current issues of information technology and relate those issues to the firm.
- Interpret how to use information technology to solve business problems. .
- Illustrate the impact of information systems in society.
- Demonstrate the role of database in supporting web Applications.

COURSE CONTENT:

UNIT I

Introduction system, components of a system, Concept of Data, information, knowledge and intelligence. Attributes of information system. Introduction to information system: concepts, Evolution of information system, framework, categories of information system. Attributes of Information system, Relationship between Organization & Information systems. Overview of Management Information Systems: Introduction, Concepts & characteristics, Components of MIS, Role of MIS,

UNIT II

Introduction to decision making: Structured versus unstructured Decisions, Managerial Decision Making Process, Types of Decisions, Simons Model of decision making, Decision Support Systems: Overview, Concepts, Characteristics & Components, Overview of MBMS

UNIT III

Expert system: Basic Concepts, Comparison of conventional & expert systems, Structure of expert system, "ES vs DSS" Executive support system: Needs & characteristics, Role of executive support system in organization,

TEXT BOOKS:

1. Laudon,"Management of information systems"
2. Jawadekar, "Management Infromation Systems",
3. Turban, Efraim, Ephraim McLean, and James Wetherbe.

REFERENCES:

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

Course Title: Elements of Business Management
Course Code: MIT-2E4-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- Define and explain the major management functions.
- Compare and contrast a variety of organizational structures.
- Explain how economic and social changes affect businesses.
- Describe methods, which an organization can use to effectively manage its personnel policies, practices and resources.
- To understand basics of motivation and leadership qualities

COURSE CONTENT:

UNIT I

Evolution of Management thought- Classical, Behavioral & Management Science, Managerial Process, functions, skills & roles in an organization, Levels of management, Planning concepts, process & parameters. Types of planning. The control process: concepts & significance, Importance of organization, formal organization elements; organizational chart, recruitment & selection; Sources of recruitment, selection criteria.

UNIT II

Motivation: meanings & approaches: carrot & stick approach , content theories of work motivation – Maslow's Need Hierarchy theory; Herzberg's motivation theory; Management control & audits; accounting audit. The management audit; purpose & scope.

UNIT III

Leadership: Meaning of leadership, Theories of Leadership; Trait theory; Situation theory; Path-Goal leadership Model; Leadership skills, Individual decision making & problem solving, Understanding & Managing group processing, Interpersonal & group dynamics

TEXT BOOKS:

1. George R. Terry & Stephan G. Franklin, "Principles of Management".

REFERENCES:

1. Banerjee shyam, “principles & practices of management”.
2. Knootz, Harold & C.O. Dinell, “Management a system contingency analysis of managerial functions”.

Semester - III

Semester-III(26 Credit Semester)						
Course Code	**Course Name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
18 Core Credit Units						
MIT-3T1-C	Java Programming	Core	2	1	4	5
MIT-3T2-C	Design and Analysis of Algorithms	Core	2	1	4	5
MIT-3T3-C	Data Communication and Computer Networks	Core	4	0	0	4
MIT-3T4-C	Operating System	Core	4	0	0	4
6 Elective Credit Units						
MIT-3E1-DCE	Programming Languages and Paradigms	DCE	3	0	0	3
MIT-3E2-DCE	Open Source Web Technologies	DCE	2	1	0	3
MIT-3E3-DCE	Soft Computing	DCE	3	0	0	3
MIT-3E4-DCE	Parallel and Distributed Computing	DCE	3	0	0	3
MIT-3E5-DCE	Multimedia & Image Authoring	DCE	2	1	0	3
MIT-3E6-DCE	Wireless Communication.	DCE	3	0	0	3
2 credit units to be taken from outside departments						

Course Title: Java Programming
Course Code: MIT-3T1-C

COURSE STRUCTURE:
Paper: Core **Credits:** 5
Max Marks: 125 (**Mid Term:** 30, **End Term:** 50, **Lab:** 25, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- To cover OOPS concepts like inheritance, polymorphism, overriding etc.
- To introduce Lambda expressions, inner classes and interfaces.
- To learn about threads, assertions, logging and exception handling.
- To know about collection framework and introduction of spring framework.

COURSE CONTENT:

UNIT I

Fundamental Programming structures in Java: A simple java program, comments,datatype,variables,operators,string,input&output,controlflow,bignumbers,array
Objects & Classes: Introduction to Object Oriented programming, using predefined classes, defining your own classes, static fields &methods, method parameters, object construction, packages, the class path, documentation comments.

UNIT II

Inheritance Classes superclasses ,subclasses, object: the cosmic super class, generic array list, object wrapping & autoboxing, method with a variable number of parameters, enumeration class,reflection, design hints for inheritance. Interfaces lambda expressions & inner classes
Interfaces, examples of interfaces, lambdaexpressions, innerclasses,proxies. Exceptions ,assertion& logging dealing with errors, catching exception,usingassertion,logging,

UNIT III

Generic Programming why generic programming, defining a simple generic class,genericmethods ,bound for type variables, generic code & virtual machine. restriction& limitation, inheritance rules for generic types, wildcardtypes, reflection& generics. Collections
Java collection framework,concreteframeworks,Maps,Views&wrappers,Algorithms,Legacy collections

Unit IV

Concurrency Introduction to threads, Interrupting threads, thread states, thread properties, synchronization, blocking queues, thread safe collections, callables & futures, executors, synchronizers, Introduction to inversion of control using Spring IOC.

TEXT BOOKS:

1. Core Java Volume 1-Fundamentals by Cay S.horstman 10th edition Publisher: Prentice Hall

REFERENCE BOOKS:

1. Java the complete reference by Herbert Schield 10th edition Publisher:Tata Mc Graw Hill
2. Java How to program Dietel and Dietel

Course Title: Design & Analysis of Algorithms
Course Code: MIT-3T2-C

COURSE STRUCTURE:
Paper: Core **Credits:** 5
Max Marks: 125 (**Mid Term:** 30, **End Term:** 50, **Lab:** 25, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVE:

- The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case, emphasis will be on rigorously proving correctness of the algorithm. In addition, the analysis of the algorithm will be used to show the efficiency of the algorithm over the naive techniques.

COURSE CONTENT:

UNIT I

Algorithms: Introduction, Importance, Performance Analysis, Designing Algorithms, Growth of Functions, Asymptotic Notations, Solving Recurrences. Review of Data Structures: Stacks, Queues, Trees, Graphs & Hashing.

UNIT II

Divide & Conquer: General Method, Binary Search, MinMax Problem, Merge Sort, Quick Sort, Strassen's Matrix Multiplication. Greedy Method: General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum Cost Spanning Trees, Optimal Storage on Tapes, Optimal Merge Pattern, Single Source Shortest Paths.

UNIT III

Dynamic Programming: General Method, Multistage Graphs, All Pair Shortest Paths, Traveling Salesperson Problem. Backtracking: General Method, N-Queen Problem, Sum of Subsets Problem, Graph Coloring, 0-1 Knapsack Problem.

UNIT IV

Branch & Bound: General Method, Least Cost Branch & Bound, 8-Queen Problem.
Lower Bound Theory: Comparison Trees, Lower Bounds through Reductions, P & NP Problems, NP Hard & NP Complete Problems, Handling of NP Hard Problems.
Parallel Algorithms: Basic Concept, Architectures, Effect of Parallelism

TEXT BOOKS:

1. Introduction to Algorithms, by Cormen, Leiserson, Rivest, and Stein, MIT Press, Third Edition, 2009.

REFERENCE BOOKS:

1. Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw-Hill Education, 2006.
2. Computer Algorithms, by Horowitz, Sahni, and Rajasekaran, Silicon Press, 2007.
3. Algorithm Design, by Kleinberg and Tardos, Pearson, 2005.
4. Algorithm Design, by Goodrich and Tamassia, Wiley, 2001.

Course Title: Data Communication & Computer Networks
Course Code: MIT-3T3-C

COURSE STRUCTURE:
Paper: Core **Credits:** 4
Max Marks: 100 (**Mid Term:** 30, **End Term:** 50, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- To familiarize students with the fundamentals and concepts of data communication.
- To make students aware about the various tasks needed to handle data communications.
- To familiarize students about the concepts, application & setup of computer networking.
- To make students aware about the taxonomy and terminology of the computer networking area.
- To introduce students to the advanced networking concepts like network programming.
- To make students aware about the security in computer networks.
- To lay a platform for understanding the advanced networking like Grid, Cloud, and Wireless.

COURSE CONTENT:

UNIT I

Principles of Data Communication, Data Communication Model & Tasks, Concept of Bandwidth & Channel Capacity, Nyquist's Law& Shannon's Law for Quantification of Capacity, Data Rate Versus Baud Rate, Sampling & its types, Nyquist Criterion for Sampling, Data Transmission Concepts, Characteristics of Signals: Digital Signals, Analog Signals (Amplitude, Frequency, Period, Wavelength, Signal to Noise Ratio).

UNIT II

Data Encoding: NRZ-L, NRZ-I Encoding, Multilevel Binary &Biphase Encoding Techniques & their implementations. ASK, FSK, PSK & QPSK. PCM: Sampling & Quantization & Modulation, Delta Modulation, Amplitude Modulation. Reliable Transmission of Data: Asynchronous & Synchronous Transmission, Multiplexing: Concepts & Types (FDM, Synchronous & Statistical TDM). Error Detection: Parity Based, CRC-Based, Checksum Based. Error Control & Recovery Techniques, Concept of ARQ Standard & its Versions.

UNIT III

Goals & Applications of Computer Network. OSI model. TCP/IP protocol suite. LAN: Ethernet & Token Ring. WAN: Concept, Characteristics, & Architecture: WAN subnet. Internetworking Concept & Architectural Model, Connection Oriented & Connectionless Approaches, Packet switching & Circuit switching. Concept of Autonomous Systems. Internet Layer Protocols: IP (Addressing: Classful& classless IP Addressing, IP Multicasting, Routing, Fragmentation& Reassembly).

UNIT IV

ICMP, ARP, RARP. Routing Protocols: Interior (OSPF), Exterior (BGP). Transport Layer Protocols: TCP & UDP. Socket API for Network Programming: Concept of Port & Sockets. Basic Server Architectures. TCP Server & Client. UDP Server & Client. Network Security: Principles of Security, Firewalls & their Components, Encryption Techniques & examples of Encryption Standard (DES, AES & RSA).

TEXT BOOK:

1. Forouzan B. "Data Commuincation & Networking", TMH

REFERENCES:

1. Computer Networks ,A.S. Tanenbaum, Pearson Education
2. Computer Network, S.S.Shinde, New Age International Publisher.
3. Data & Computer Communication , Shashi Banzal ,Firewall media
4. Data & Computer communication, William Stallings, Pearson

Course Title: Operating System
Course Code: MIT-3T4-C

COURSE STRUCTURE:
Paper: Core **Credits:** 4
Max Marks: 100 (**Mid Term:** 30, **End Term:** 50, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in memory management I/O management and file management in OS
- To gain knowledge on Mutual exclusion algorithms, deadlock detection algorithms
- To know the components and management aspects of concurrency management
- To implement the concepts learnt through case studies of different operating systems.

COURSE CONTENT:

Unit I

Overview of an Operating system, Functions of Operating System. Process and thread Management Concepts: Process Scheduling, Scheduling Criteria, Scheduling algorithms, Thread Scheduling. Process Synchronization, Semaphores, Critical Section and Monitors, Inter-process Communication, shared memory model and message passing. Deadlocks: Concept of Deadlock, Deadlock prevention, avoidance, detection and Deadlock recovery", Case Studies: LINUX/Windows OS/Android OS (Any one)

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Unit II

Memory Management: Linking, Loading, Memory Allocation, Design Issues & Problems, Fragmentation, Compaction, Memory Management Unit, Paging, Segmentation, Virtual Memory, Demand Paging. Page Replacement Algorithms. Allocation Algorithms, Thrashing Case Studies: LINUX/Windows OS/Android OS (Any one)

Unit III

File Management-File Systems & I/O Device Drivers, Disk Driver, Access Strategies, File Systems, File System Organization, Design Techniques. Multiprocessor Systems. Types of Multiprocessor Operating Systems, Functions & Requirements, Design & Implementation Issues. (Any One)

Unit IV

Case Studies: UNIX/LINUX/Windows NT OS, Users View, Design Principles, Implementation, Process Management, Memory Management, File System, I/O System.

TEXT BOOKS:

1. Tanenbaum, A.S., “Modern Operating System”, PHI
2. Peterson, J.L. Abraham, Silberschatz, “Operating System Concepts”, Addison Wesley

REFERENCES:

1. Dietel H.M. “An Introduction To Operating System”, Addison Wesley
2. Karnetkar, “UNIX Shell Programming”, BPB
3. W.Stallings, “Operating systems”
4. Dhamdhere, “An Operating System –Design & principles”
5. Madnick E, Donovan J, “Operating Systems”, TMH
6. Marko Gergent, ”Learning android”, O’rielly

Course Title: Programming Languages & Paradigms
Course Code MIT-3E1-DCE

COURSE STRUCTURE:
Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVE:

- The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case, emphasis will be on rigorously proving correctness of the algorithm. In addition, the analysis of the algorithm will be used to show the efficiency of the algorithm over the naive techniques.

COURSE CONTENT:

UNIT I

The role of Programming Languages: Towards Higher Level Languages programming paradigms, Language implementation. Language Description: Syntactic Structures, Expression Notations, Abstract Syntax trees, Lexical Syntax. Data Representation: The role of types, basic types, arrays, unions & variant records, Sets, Pointers, Two String tables, types & error checking. Procedure Activations: Introduction to Procedures, parameter passing methods, nested scope in source text, activation records, lexical scope: procedures as in C.

UNIT II

Object oriented Programming: class declarations in C++, dynamic allocation in C++, Information hiding. Functional Programming : Language of expressions , types, values & operations , approaches to expression evaluation, lexical scope, type checking, Function declaration by cases , Functions as first-class values, Implicit types, data types exception handling. Introduction to Prolog, data structures in Prolog, Programming techniques, controls in Prolog, Cuts

UNIT III

An introduction to concurrent Programming: Parallelism in hardware, Streams: implicit synchronization, concurrency as interleaving, Liveliness properties, safe accesses to shared data concurrency in ADA. Language Description: Semantic Methods, Synthesized attributes, Attribute grammars, natural semantics, Denotational Semantics.

TEXT BOOKS:

1. Ravi Sethi," Programming Languages ,Concepts & Constructs", Pearson Education
2. Freidman, Wand, Haynes, "Essentials of Programming Languages", PHI.

REFERENCES:

1. Concepts of Programming Languages Robert .W. Sebesta 8/e, Pearson Education, 2008.
2. Programming languages – Watt, Wiley Dreamtech, 2004.
3. Programming Languages – Louden, Second Edition, Cengage,2003.
4. Programming languages – Ghezzi, 3/e, John Wiley, 1998.
5. Programming Languages Design and Implementation – Pratt and Zelkowitz, Fourth Edition
6. PHI/Pearson Education, 2001.

Course Title: Open Source Technologies Web Technologies
Course Code: MIT-3E2-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To learn about Linux Administration.
- To learn PHP and its database connectivity.
- To learn how to create Websites with PHP MY-SQL.
- To learn Content Management System. And Introduction to No-Sql.

COURSE CONTENT:

UNIT I

Introduction to Linux – Architecture, Installation, Configuration, Package Management, Basic Linux commands - file system commands, vim. Apache Http Server – installation, basic configuration, setting up virtual hosts, installation of modules, etc

UNIT II

Introduction to PHP - variables, data types, basic constructs, loops, functions, classes. Installation of third party php modules. Introduction to MySQL database. PHP-MySQL connectivity. Introduction to HTTP – HTTP methods, headers, cookies, etc. Creating a basic website with PHP & MySQL.

UNIT III

Content management system based on php&mysql e.g. Wordpress& Drupal – installation, configuration. Introduction to NoSQL – installation & configuration of Mongodb. Basic select, insert, update & delete operations, aggregate operations. Backup & restoration.

TEXT BOOKS:

1. Core Java Volume 1-Fundamentals by Cay S.horstman 10th edition Publisher: Prentice Hall

REFERENCE BOOKS:

1. Java the complete reference by Herbert Schield 10th edition Publisher:Tata Mc Graw Hill
2. Java How to program Dietel and Dietel

Course Title: Soft Computing
Course Code. MIT-3E3-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- Describe human intelligence and AI.
- Explain how intelligent system works.
- Apply basics of Fuzzy logic and neural networks.
- Discuss the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- Relate with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems.
- Describe with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.

COURSE CONTENT:

UNIT I

Soft Computing & AI: Introduction & applications of soft computing, soft computing vs. hard computing, Artificial Intelligence: Introduction & application, Intelligent Agents, Structure of Intelligent Agents & types of agents.

UNIT II

Neural Networks & Fuzzy Logic: Neural networks: Characteristics, artificial neural net terminology, Model of a neuron, Topology, Learning, types of learning Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions.

UNIT III

Support vector machines, Introduction to Evolutionary computation: Evolutionary algorithms-genetic & differential evolution, Swarm intelligence, Population based meta heuristic methods,

TEXT BOOKS:

1. Introduction to Soft Computing, Eva Volna
2. Artificial Intelligence-A Modern Approach" – by Stuart Russell, Peter Norvig, , Pearson Education

REFERENCES:

1. Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, S,
2. Rajasekaranand G.A. VijayalakshmiPai, PHI Publication.
3. Introduction to artificial neural systems - by J.M. Zurada.(Jaico Pub)
4. Artificial Intelligence, Rich E & Knight K, TMH, New Delhi.
5. Neural Network fundamental with Graph , Algo.andAppl, by Bose, TMH
6. Neural Network & Fuzzy System, by Kosko PHI Publication
7. Neural Networks & Fuzzy Logic - by Bart Kosko
8. Neural computing theory & practice - by P.D. wasserman (ANZA PUB).
9. Principles of Soft Computing, S.N. Sivanandamand S.N. Deepa, Wiley Publications

Course Title: Parallel & Distributed Computing
Course Code: MIT-3E4-DCE

COURSE STRUCTURE:
Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To develop and apply knowledge of parallel and distributed computing techniques and methodologies.
- To gain experience in the design, development, and performance analysis of parallel and distributed applications.
- To gain experience in the application of fundamental Computer Science methods and algorithms in the development of parallel applications.
- To gain experience in the design, testing, and performance analysis of a software system, and to be able to communicate that design to others.

COURSE CONTENT:

UNIT I

Characterization of Distributed System, Design Issues & User Requirements. Inter-process Communication-Synchronous & Asynchronous, Client – Server Communication, Group Communication, Remote Procedure Call- Design Issues & Implementation.

UNIT II

Distributed OS- Design Issues - File Service Design Issues. Name Service, Time & Coordination- Physical & Logical Clocks, Distributed Co-Ordination.
Replication- Issues & Implementation Shared Data & Transactions- Distributed Transactions, Concurrency Control, Recovery & Fault Tolerance, Security- Design Issues & Case Studies.

UNIT III

Parallel Model, languages & Compilers: Parallel programming model, parallel languages & compilers, dependence analysis of data arrays, code optimization & scheduling, loop parallelization & pipelining.
Parallel program development & environment: parallel programming environments, synchronization & multiprocessing models, shared variable program structure, message-passing program development, mapping programs onto multicomputer.

TEXT BOOKS:

1. Distributed Systems. Concepts and Design. 5th edition/ George Coulouris ,Jean Dollimore Tim Kindberg & Gordon Blair Lancaster University

REFERENCES:

1. Coulouri,"Distributed Systems"
2. Tanenbaum,"Distributed Operating System".
3. Raynal,"Distributed Algorithms".
4. Kai Hwang,"Advanced computer architecture,Parallelism,Scalability,Programming", TMH
5. V. RajaRaman," Elements of Parallel Computing"

Course Title: Multimedia & Image Authoring
Course Code: MIT-3E5-DCE

COURSE STRUCTURE:
Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- The main objective of the course is to learn and master the necessary skills in order to apply the most advanced technologies in computer graphics and multimedia systems, so that the students, will be able to decide the best techniques to be used or implemented in the creation, design and implementation of a graphical or multimedia application.
- Explore the Photoshop interface and use several tools for selecting parts of images. Learn to use layers and to apply layer effects and filters to create special effects. Additionally, use painting tools and blending modes to create shading effects.

COURSE CONTENT:

UNIT I

Multimedia System Design: Concept of multimedia, Multimedia Applications, Elements of Multimedia (Graphics/Images, Text, Audio, Video), Hypermedia vs hypertext, Overview of Multimedia authoring , authoring tools: Adobe Photoshop, Macromedia Flash, Dreamweaver, Windows Movie Maker. Study of File formats: Sound (AIFF, MIDI, WAV, MP3, ASF), Video (MPEG/MPG, AVI, MP4, 3GP, FLV). Image File Formats: TIFF, BMP, JPG/JPEG, GIF, PSD.

UNIT II

Image Editing Software (Adobe Photoshop) Basic Concepts: An Introduction, Menus, Toolbox, Color control icons, Mode control icons, Window controls icons, canvas, layers.
Layers: Adding layers, dragging and pasting selections on to layers, dragging layers between files, viewing and hiding layers, Editing layers, rotating selections, scaling an object, preserving layers transparency, moving and copying layers, duplicating layers, deleting layers, merging layers, using adjustment layers;

UNIT III

Channels and Masks: Channel palette, showing and hiding channels, splitting channels in to separate image, merging channels, creating a quick mask, editing masks using quick mask mode;
Painting and Editing: Brushes palette, brush shape, creating and deleting brushes, creating custom brushes, setting brush options, saving, loading and appending brushes, Options palette; Opacity, pressure, or exposure, paint fade-out rate, Using Selection tool.

TEXT BOOKS:

1. Fundamentals of multimedia By Ze-Nian li and Mark s.Drew,Simon
2. Inside Adobe Photoshop 6-Bouton,Tay Vaughan. Tata McGraw Hill

REFERENCES:

1. Andleigh PK and Thakrar K, “Multimedia Systems”, Addison Wesley Longman, 1999.
2. Fred Halsall, “Multimedia Communications”, Addison Wesley, 2000.
3. Fundamentals of Multimedia By Ze-Nian Li and Mark S. Drew , Simon Fraser University, Pearson Education International.
4. Mastering CorelDraw 9 – Altman (BPB)

Course Title: Wireless Communications
Course Code: MIT-3E6-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- The objective of this course is to give an introduction to the fundamentals of the wireless communications systems, the wireless network architectures, protocols, and applications.
- To provide an overview of Wireless Communication networks area and its applications in communication engineering.
- To enable the student to synthesis and analyze wireless and mobile cellular communication systems over a stochastic fading channel
- To provide the student with an understanding of advanced multiple access techniques.
- To provide the student with an understanding of diversity reception techniques
- To give the student an understanding digital cellular systems (cdma2000, W-CDMA, LTE and candidate 5G waveforms).

COURSE CONTENT:

UNIT I

Wireless Communication Systems: Basic Concepts, Wireless Networks, Wireless vs Wired networks, Classification of Wireless Networks. Wireless Transmission Concepts: Antennas, Types of antennas, Signal propagation, Multipath propagation. Types of Wireless Telephones (Cordless, Fixed Wireless (WLL), Wireless With Limited Mobility (WLL-M), Fully Mobile Wireless Phones). Introduction to various Generations of Mobile Phone Technologies. Wireline/Wireless Portion of Mobile Communication Network.

UNIT II

Electromagnetic spectrum, its use & allocation to well-known bands. Multiple Access Techniques: FDMA, TDMA & CDMA. Basic concepts of Spread Spectrum(SS) technique; Direct Sequence SS versus Frequency Hopping SS. Concept of cells, sectorization, coverage area, frequency reuse, cellular networks, microcells & handoffs. Simplified Implementation Of IS-95 CDMA Using Chip Sequences, Concept of (Walsh) Code, Concept Of CDMA (PCS andCellular) Channel, Forward & Reverse CDMA Channel for a Cell/Sector, Comparison of Cellular/PCS CDMA Networks, Frequencies & Cell-Sizes.

UNIT III

Cellular Mobile Systems: Introduction & Overview of GSM/CDMA. Channel: Types, Forward & Reverse CDMA channel for a cell/sector (Pilot, Sync, Paging, Forward Traffic Channels, Access, Reverse TC). Concept of Voice Coding. Components of Mobile Network Architecture: MS, BTS, BSC, MSC, & their basic Functions. Types of Handoffs in GSM. Use of HLR & VLR in Mobile Networks. Concept of Mobile IP & WAP. Wireless LAN Technology: Overview of Wifi & the IEEE 802.11. Concept of Bluetooth & IEEE 802.15.

TEXT BOOKS:

1. T. Rappaport, "Wireless Communications, Principles andamp; Practice", Pearson andy Dornan, "The Essential Guide to Wireless Communications", Pearson
2. Jochen Schiller, "Mobile Communications", Pearson andrew Tanenbaum, "Computer Networks", PHI

REFERENCES:

1. William Stallings, "Wireless Communications & Networks", Pearson
2. K.Pahlavan, P.Krishnamurthy, "Principles of Wireless Networks", Pearson Education.

Semester– IV

Semester-IV(26 Credit Semester)						
Course Code	**Course Name**	**Paper category**	**Hours / Week**			**Credits**
			L	T	P	
20 Core Credit Units						
MIT-4T1-C	Research Methodologies	Core	4	0	0	4
MIT-4T2-C	Theory of Computation & Formal Languages	Core	4	0	0	4
MIT-4T3-C	Major Project Work	Core				12
6 Elective Credit Units						
MIT-4E1-DCE	Bio Informatics	DCE	3	0	0	3
MIT-4E2-DCE	Cloud and Grid Computing	DCE	3	0	0	3
MIT-4E3-DCE	Information Security and Networks	DCE	3	0	0	3
MIT-4E4-DCE	Pattern Recognition	DCE	2	1	0	3
MIT-4E5-DCE	Data Warehousing and Mining	DCE	3	0	0	3
MIT-4E6-DCE	Organizational Behaviour	DCE	3	0	0	3
MIT-4E7-DCE	Machine Learning	DCE	3	0	0	3
MIT-4E8-DCE	Dot Net	DCE	2	1	0	3
MIT-4E9-DCE	Data Mining	DCE	3	0	0	3
MIT-4E10-DCE	Advanced Java	DCE	3	0	0	3

Course Title: Research Methodology
Course Code: MIT-4T1-C

COURSE STRUCTURE:
Paper: Core **Credits:** 4
Max Marks: 100 (**Mid Term:** 30, **End Term:** 50, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- This subject provides students with an overview of the variety of research methods used in computer science to pursue research and to impart analytical skills among students to investigate for problems and other relevant challenges thereafter simultaneously equip them to determine which research method best answers the identified problem. Research challenges, including appropriate selection of design, research participants, sample size, data collection, and selection of appropriate measures, data analysis and interpretation of results are studied. Concepts such as validity, reliability, and rigour are examined in relation to the methodological approaches explored throughout the subject. The concept of collecting, summarizing, analyzing, interpreting, drawing conclusions, and presenting the numerical data, are also covered. Students will have opportunities to advance their understanding of data analysis methods required to interpret data collected during the course of the proposed research.

COURSE CONTENT:

UNIT I

Concept of Research: Introduction to research, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research & Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research. What is a Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem.

UNIT II

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Different Research Designs, Basic Principles of Experimental Designs, Sampling Design: Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs. Methods of Data Collection.

UNIT III

Testing of Hypothesis: What is a Hypothesis, Basic Concepts Concerning Testing of Hypothesis, Procedure for Hypothesis Testing, Data Analysis: Data Preparation, Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations & Chi-square test.

UNIT IV

Report Writing: Meaning of Interpretation , Technique of Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Computers & Researcher.

TEXT BOOKS:

1. Research Methodology – C.R.Kothari

REFERENCE BOOKS:

1. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
2. Business Research Methods – Alan Bryman & Emma Bell, Oxford University Press

Course Title: Theory of Computation & Formal Languages
Course Code: MIT-4T2-C

COURSE STRUCTURE:
Paper: Core **Credits:** 4
Max Marks: 100 (**Mid Term:** 30, **End Term:** 50, **Viva:** 10, **Attn. /Assign:** 10)

COURSE OBJECTIVES:

- To be able to construct finite state machines and the equivalent regular expressions.
- To understand the class of languages described by finite state machines and regular expressions.
- To understand and construct pushdown automata and the equivalent context free grammars.
- To understand the concept of construct Linear bounded automata and the equivalent context Sensitive grammars.
- To understand the concept of Turing Machine and Universal Turing machine

COURSE CONTENT:

UNIT I

Introduction to Set Theory, Introduction to Automata, Alphabets, String, Languages, Strings, Kleen Star, Kleen Plus, Introduction to Finite automata, Deterministic finite automata, DFA notations (Transition Table, Transition Table) Languages Accepted by DFA, Designing DFA by pattern recognition, Application of DFA, Non-deterministic Finite Automata, Language accepted by NDFA, Conversion of DFA to NDFA, Overview of e-NDFA. DFA vs NDFA vs e-NDFA,

UNIT II

Finite Automata & Regular Expressions: Definition, Basic Regular Expressions, Obtaining regular expression: Using Basics Expressions & State Elimination Method, Application of regular Expressions, Regular Languages: Definition, Properties, and Pumping Lemma for Regular Languages, Decidable and Closure properties of Regular languages. Limitation of Finite Automata, Equivalence & minimization of DFA.

UNIT III

Introduction to Grammar, Chomsky Hierarchy, Generation of Grammar from Finite Automata & Regular Expressions, Derivation Trees, Left most and Right Most Derivation Trees, Ambiguous Grammar, Context Free Grammar and its applications, properties of context free languages.

Introduction to Push down Automata, Transition & Graphical Representation.

UNIT IV

Introduction to Linear bounded Automata & Turing Machine. Turing machine model, transition table Instantaneous definition, Acceptance and Construction of Turing machine. Standard Turing machine, Transducers, Lexical and Syntax Analyse: Parsing, Top down Parsing (Predictive parsers, LL (K), recursive Descent) and Bottom up Parsing (LR (K)).

TEXT BOOKS:

1. Fintite Automata and Formal Languages"- A Simple Approach, A.M Padma Read Pearson Education

REFERENCES:

1. Hopcroft, J., & Ullman, J., "Introduction to Automata Theory, Languages & Computation", Pearson Education
2. Hopcroft J, R. Motwani, & J. Ullman, "Introduction to Automata Theory, Languages & Computation", Pearson Education
3. P. Linz, "Introduction to Formal Languages & Automata", Jones &Barlett PWS Publishing Company
4. Donald Knuth, "The Art of Computer Programming", Prentice Hall

Course Title: Project Work
Course Code: MIT-4T3-C

Project Work

Course Title: Bioinformatics
Course Code: MIT-4E1-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

This is an interdisciplinary course introduced to understand the basis relationship that exit between computers science and biological science. In this course the emphasis is made to make students to understand the basics of bioinformatics and their applications. Moreover, the students will also learn about the basis genetic makeup of human genome. The course focuses on a general introduction to the uses of biological databases in generating biological knowledge to better understand living systems. Topics include molecular biology, protein synthesis, Genomic Era, the anatomy of genome, probabilistic models of genome sequences, biological databases, sequence alignment, gene and promoter prediction, molecular phylogenetic, post genomic epidemic, structural bioinformatics and proteomics.

COURSE CONTENT:

UNIT 1

Introduction to biology, Living cell: characteristics & functions, basics of molecular biology: DNA, RNA, gene, genetic code, processes of transcription, translation, splicing etc. ,basics of proteins, sequences, structure & functions of proteins, Introduction tobioinformatics: Definitions & concepts, & the role of bioinformatics, Types of biological data.

UNIT 2

Introduction to databases, types of Biological Databases – flat file databases, relational databases, object-oriented databases, introduction to biological databases**,** Sequence databases (EMBL, GenBank, DDBJ, SWISS-PROT, PIR, TrEMBL), search engines: SRS,ENTREZ. BLAST, FASTA.

UNIT 3

Basic overview of algorithms: Space & time complexity. Need & significance of sequence alignment. Global & local alignments , techniques of sequence alignments: Doplot, Needleman-wunsch algorithm for global alignment, Smith-waterman algorithm for local alignments ,substitution matrices: PAM, Blosum etc. Gene prediction(ab initio & similarity based). Ontologies in bioinformatics: need for ontologies.

TEXT BOOKS:

1. Harshawardhan P. Bal." Bioinformatics Principles & Application

REFERENCE BOOKS:

1. Harshawardhan P. Bal." Bioinformatics Principles & Applications" O'Reily
2. T. K. Attwood & D J Parry-Smith, "Introduction to bioinformatics", Pearson Education
3. Jean-Michel Claveriw, CerdricNotredame, "Bioinformatics – A beginner's Guide", WILEY DreamTech India Pvt
4. S.C. Rastogi, N. Mendiratta" Bioinformatics Methods &Applications"TMH
5. Krane ,"Bioinformatic", Pearson Education
6. B. Bergeron, "Bioinformatics Computing", Pearson
7. D. E. Krene& M.L. Payma, "Fundamental concepts of Bioinformatics", Pearson

Course Title: Cloud & Grid Computing
Course Code: MIT-4E2-DCE

COURSE STRUCTURE:
Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVE:

The objective of studying Cloud and Grid Computing is that it enables new social services by connecting users via social networks that are constructed using multiple cloud service and it will run the software industry upside down. Thus educates potential users about the benefits of cloud computing and the best way to make full use of them.

COURSE CONTENT:

UNIT I

Cloud Computing: Introduction to cloud & Cluster computing, cloud computing vs cluster computing, Evolution of cloud computing, principles of cloud computing, cloud Computing architecture, Cloud computing applications. Cloud service models (IaaS, PaaS, SaaS), could Deployment models (Public, Private, hybrid& community models). Challenge and Security Issues

UNIT II

Grid Computing: Introduction to Grid Computing, Characteristics, grid computing Architecture, grid complexity levels and topologies, grid components and grid layers, applications of Grid Computing. Grid security issues: Authorization and Authentication methods, Grid computing vs Cloud Computing Cluster Computing.

UNIT III

Introduction to OGSA, Services, Schema and architecture, Overview of OGSI, Virtualization: Virtual machines and visualization of clusters and data centres, levels of virtualization, virtualization structures and tools and mechanism, virtualization of CPU, Memory & I/O devices

TEXT BOOKS:

1. Cloud Computing by pankaj Sharma published by S.K.Kataria and Sons.
2. Cloud Computig Bible:Published by Wiley India Pvt. Ltd.
3. Grid and Cloud Computing and Applications: The 2014 World Comp International Conference.Publisher C.S.R.E.A
4. Grid, Cloud and Cluster Computing and Applications by Hamid R.Arabnia, Ashu M.G.Solo

REFERENCE BOOKS:

1. Mastering Cloud Computing, Paperback-1 Feb 2013 by Buyya, Vecchiola&Selvi.
2. Cloud Computing: Concepts, Technology & Architecture, 1e Paperback-2014 by Erl.
3. Grid & Cloud Computing, a business perspective on Technology & Applications, Springer by Stanoevska-Slabeva, Katarina, Wozniak, Thomas, Ristol, Santi (Eds.)

1.

Course Title: Information Security & Networks
Course Code: MIT-4E3-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
- To Gain familiarity with prevalent network and distributed system attacks, defences against them, and forensics to investigate the aftermath.
- Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.
- Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

COURSE CONTENT:

UNIT I

Introduction: Security trends, the OSI Security Architecture, Security attacks, Security mechanisms, Security services, Model for Network Security. Encryption: Symmetric & Asymmetric Encryption, Symmetric Cipher model, Substitution techniques (Mono-alphabetic & Poly-alphabetic) & Transposition Technique, Rotor Machines, Block and Stream ciphers, Modern Round Ciphers: DES, AES, Introduction to Steganography. Encryption vs Steganography.

UNIT II

Introduction to Number Theory: Prime Numbers, Fermat's & Euler's theorem & discrete logarithms. Public Key Cryptography & RSA. Key management: Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic & Elliptic Curve Cryptography. Message Authentication & Hash functions. Digital Signatures & Authentication protocols. Network Security Applications: IP Security

UNIT III

Mechanics of Routing Protocols: Routing , Static and Dynamic Routing, Distant vector routing & link state routing, Internet working with Dissimilar Protocols, Protocol design Consideration: Simplicity, flexibility, Optimality, Overhead & Scaling, Operation above Capacity, forward

compatibility. Migration: Routing Algorithms & addressing parameters, making multi-protocol operation possible,

Network Security: Security Features in Wireless Adhoc & Wireless Sensor Networks.

TEXT BOOKS

1. William Stalling ," Cryptography & Network Security", Pearson Education

REERENCES:

1. Radia Perlman, "Interconnections: Bridges, Routers switches & Internet-working protocols Pearson education
2. Mark Sportack, "IP Routing Fundamentals", Pearson Education
3. Gerard J. Holzmann, "Design & Validation Computer Protocols", Prentice Hall

Course Title: Pattern Recognition
Course Code: MIT-4E4-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- Provide knowledge of models, methods and tools used to solve classification feature selection and density estimation problem.
- Provide knowledge of learning and adaptation in supervised models of learning.
- Provide knowledge of recognition, decision making and statistical learning problems.
- Provide knowledge of current research topics and issues in pattern recognition.

COURSE CONTENT:

UNIT I

Introduction to Pattern Recognition, Pattern recognition approaches, pattern recognition applications, Pattern recognition systems: Sensing, Segmentation & grouping, Feature extraction, Classification, Post processing. Design cycle, Statistical pattern recognition, syntactic (structural) pattern recognition, neural pattern recognition, Parameter estimation techniques, Non-parametric Pattern Recognition

UNIT II

Introduction to Bayesian decision theory, Bayesian estimation: Gaussian distribution, ML estimation, EM algorithm, Feature selection & extraction techniques, Linear Discriminant Functions, Introduction to Dimension Reduction techniques.

UNIT III

Supervised Learning, Unsupervised Learning, Reinforcement Learning, Support Vector Machines, Bayesian Belief Nets, Bayes estimation (learning). Density estimation, Probabilistic Classification. Maximum Likelihood parameter estimation. Bias & Biased Estimates.

TEXT BOOKS:

1. Pattern Classification. Duda, Richard O., Peter E. Hart, and David G. Stork. John Wiley & Sons.

REERENCES:

1. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2. Introduction to Machine Learning Edition 2, by EthemAlpaydin
3. Introduction to Artificial Intelligence – RajendraAkerkar, PHI.
4. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/Pearson Education.
5. Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition
6. Artificial Intelligence & Expert Systems – Patterson PHI
7. Expert Systems: Principles & Programming- Fourth Edn, Giarrantana/ Riley, Thomson

Course Title: Data Warehouse
Course Code: MIT-4E5-DCE

COURSE STRUCTURE:
Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To provide students with an understanding of the fundamentals of data warehouse, its basic components and the role of data warehouse in decision support.
- To provide knowledge of the important steps and techniques to be considered during data warehouse development, future trends and usage of data warehouse.
- To introduce the concept of dimensional modelling technique for designing a data warehouse.
- To provide knowledge of data integration and the extraction, transformation and load (ETL) processes.
- To introduce students to the methods and tools for accessing and analyzing the warehouse data.

COURSE CONTENT:

UNIT I

Overview of decision support systems: Organizational need for strategic information, Failures of past decision-support systems, operational versus decision-support systems, data warehousing – the only viable solution, data warehouse defined. Data warehouse – The building Blocks: Defining Features, data warehouses & data marts, overview of the components, metadata in the data warehouse
Defining the business requirements: Dimensional analysis, information packages – a new concept, requirements gathering methods, requirements definition: scope & content

UNIT II

Principles of dimensional modeling: Objectives, From Requirements to data design, the STAR schema, STAR Schema Keys, Advantages of the STAR Schema
Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, aggregate fact tables.

UNIT III

OLAP in the Data Warehouse: Demand for Online analytical processing, need for multidimensional analysis, fast access & powerful calculations, limitations of other analysis

methods, OLAP is the answer, OLAP definitions & rules, OLAP characteristics, major features & functions, general features, dimensional analysis, what are hypercubes? Drill-down & roll-up, slice-&-dice or rotation, OLAP models, overview of variations, the MOLAP model, the ROLAP model, ROLAP versus MOLAP, OLAP implementation considerations

TEXT BOOKS:

1. Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons

REFERENCES:

1. Sam Anahony, "Data Warehousing in the real world: A practical guide for building decision support systems", John Wiley
2. Alex Berson,Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw Hill W. H. 5.
3. Inmon, "Building the operational data store", John Wiley
4. Kamber & Han, "Data Mining Concepts & Techniques", Hartcourt India P. Ltd

Course Title: Organizational Behavior
Course No: MIT-4E6-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVE:

This course integrates the study of management principles and practices with the study of human behavior within organizations. The focus will be upon translation of management and organizational behavior theory to practices that result in organizational effectiveness, efficiency, and human resource development. The primary goal of this course is to prepare students for advanced leadership roles in modern organization. This course will provide a good foundation for students intending to study in any major, as the main objective of this course is to provide students with the essential content and experiences they need to become a motivating student, successful manager and an effective employee in any type of work they do in the future. By taking the course students will understand themselves and other people at work and will be able to learn how to create effective work groups to be successful in life. Specific attention will be given to Organizational Behaviors, Diversity in Organization, Attitudes and Job Satisfaction, Personality and Values, Perceptions and Individual Decision Making, Motivation Concepts, Foundations of Group Behavior, Communication, Leadership, Power and Politics, and Conflict and Negotiation.

COURSE CONTENT:

UNIT I

Evolution of management Thought-Classical, Behavioral and Management Science Approaches; The Hawthorne Studies; Systems and Contingency Approach for understanding organizations; Application of Management thought to the current scenario; Fundamental Concepts of Organizational Behavior; The role of OB in Management; Managerial Process, Functions; Managerial Skills and Roles in Organizations.

UNIT II

Foundations of Individual Behavior-Personality-Meaning; Development of Personality; Personality Determinants; the "Big Five" Personality Traits; Emotional Intelligence. Perception;- Nature and importance; Factors influencing perception; Managing the Perception Process. Learning- Components of learning process; Theoretical process of learning- Classical Conditioning; Operant Conditioning; Cognitive and Social Learning Theory.

UNIT III

Attitude: Nature and dimensions; Components and functions of attitude, Formation and attitude change. Motivation in organizations: Nature and importance; The motivational framework; The content theories of work motivation- Maslow's Need Hierarchy Theory; The Dual Structure Theory of Motivation; Process theory of work motivation- Vroom's Expectancy Theory; J. Stacy Adam's Equity Theory. Note:- The list of cases and specific references will be announced by the concerned faculty in the class at the beginning of the semester.

TEXT BOOKS:

1. M.C.O.-1 Organisation theory and Behaviour .Neeraj Publications (IGNOU**)**
2. Organizational Behaviour By Stephen Robins.
3. Fundamentals of Management by Griffin,Houghton Mifflin Company

REFERENCES:

1. Essentials of Management by Andrew J/ DuBrin THOMSON-South western Management
2. Organizational Behavior by Hersey/Balanchard/Johnson Pearson Education-New Delhi
3. Organizational Behavior By Fred Luthans McGrawHill
4. Organizational Behavior By Debra/ James – THOMSON-South-Western

Course Title: Machine Learning

Course Code: MIT-4E7-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3

Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To explain Curve fitting with a specific focus on Regression analysis, logistic Regression Analysis.
- To explain different machine learning procedures which include Supervised, Unsupervised, semi supervised and reinforcement learning etc.
- To explain familiar machine learning Techniques like Support Vector Machines and its nonlinear variant.
- To explain few distribution like Gaussian, Dirichlet etc. and its subsequent use in modelling data for learning.
- To explain common applications of machine learning with a specific focus on latest developments in the said area.

COURSE CONTENT:

UNIT I

Introduction: Basic definitions, learning types: supervised & unsupervised, hypothesis space & inductive bias, evaluation, cross-validation, Linear regression, Decision trees, over fitting,Instance based learning, Feature reduction, Collaborative filtering based recommendation

UNIT II

Probability & Bayes learning Logistic Regression, Support Vector Machine, Kernel function & Kernel SVM neural network: Perceptron, multilayer network, back propagation, introduction to deep neural network Introduction to Graphical Models. Generative Vs. Discriminative Models.

UNIT III

Computational learning theory, PAC learning model, Sample complexity, VC Dimension, Ensemble learning, clustering: k-means, adaptive hierarchical clustering, Gaussian mixture model. Some application areas of machine learning e.g. Natural Language Processing, Computer Vision, applications on the web.

TEXT BOOK:

1. Michalski, Ryszard S., Jaime G. Carbonell, and Tom M. Mitchell, eds. Machine learning: An artificial intelligence approach. Springer Science & Business Media, 2013.

REFERENCES:

1. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.

2. Introduction to Machine Learning Edition 2, by Ethem Alpaydin

Course No.: MIT-4E8-DCE
Course Title: Dot Net

COURSE STRUCTURE:
Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- Understand the fundamentals of developing software applications using object oriented methodologies
- Creating C# Net applications using standard .net controls.
- Connecting to different data sources and querying the database.
- To understand the basic of ASP. Net web application

COURSE CONTENT:

UNIT I

An Overview of .NET Technology: Features of .NET, Understanding .NET Framework, Main Components of .NET Framework, The Common Language Runtime, The Common Language Specification, The Common Type System, .NET Class Libraries, Assemblies, Metadata and Attributes. Introduction to Visual Studio.NET: Exploring Visual Studio.NET Interface.

UNIT -II

C# IDE, Basic Window Controls: Text Box, Label, Check Box, List Box, Checked List Box, Radio Buttons, Buttons, Tree View and List View Controls,Objects and Type: Classes and Structs, Partial classes, static classes, Function Overloading, Operator Overloading, Inheritance: Types of inheritance, virtual methods, hiding methods, sealed classes and methods, Interfaces, Derived interfaces.

UNIT -III

Introducing Web Application, Components of Web Application, Building a Web Form, HTML Server Controls. ASP.NET, Using Visual Web Developer, Designing a Simple Web Form. Including C# Code in ASP.NET, Hosting the Web Page, IIS Web Server

An Overview of ADO.NET, Design Goals of ADO.NET, ADO.NET Architecture, Objects Used in ADO.NET Model, .NET Framework Data Providers, .NET Framework Data Provider for SQL Server, Provider for Oracle, ADO.NET DataSet Object Model, Data Binding, Types of Data Binding, Generating DataSet, Binding Controls to the DataSet

TEXT BOOKS:

1. "ASP .Net : Unleashed" , SAMS Publications'
2. Dietel &Dietel , "C# , How to Program",Pearson Education.

REFERENCES:

1. "ASP .Net for beginner",Wrox Publications
2. Visual C#.Net by John Sharp & John Jagger, PHI, New Delhi.
3. 14 lesson to get you started with c# and dot net, faraz rasheed

Course Title: Data Mining
Course Code: MIT-5E9-DCE

COURSE STRUCTURE:
Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To provide students with an overview of the methodologies and approaches to data mining.
- To Gain insights into the challenges and limitations of different data mining techniques.
- To enable students to understand and implement the data mining methods on real world datasets.
- To introduce students to the state-of-the-art methods and modern programming tools for data mining.
- To explore latest trends in data mining such as web mining and text mining.

COURSE CONTENT:

UNIT I

Data Mining: Introduction, The Knowledge Discovery Process, Major issues in Data Mining, Data Mining tasks, Applications of Data Mining, Related technologies- Machine learning and Statistics, Data Preprocessing- Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT II

Association Analysis: Basic concepts, Frequent Itemset Generation, Apriori Principle, Frequent Itemset Generation in the Apriori Algorithm, Rule Generation.
Classification: Basic Concepts, Classification by Decision Tree, Bayesian Classification, Rule based Classification, Support Vector Machines, Artificial Neural Networks- Perceptron, Multilayer Artificial Neural Network, Associative Classification, *k*- Nearest Neighbor Classifier, Genetic Algorithm.

UNIT III

Cluster Analysis: Basic Concepts, Categorization of major Clustering methods, Partitioning methods-K-means, Hierarchical methods, Density based methods-DBSCAN, Grid based methods, Clustering high dimensional data, Outliers and Outlier Analysis, Current Trends: Text Mining & Web Mining.

TEXT BOOKS:

1. Data Mining: Concepts and Techniques. J. Han, M. Kamber, and J. Pei. Morgan Kaufmann 2011

REFERENCES:

1. Data Mining: Practical Machine Learning Tools and Techniques. I. H. Witten, E. Frank, and Mark A. Hall. Morgan Kaufmann 2011.
2. Introduction to Data Mining. P.-N. Tan, M. Steinbach, and V. Kumar. Pearson education 2006.

Course Title: Advanced Java
Course Code: MIT-4E10-DCE

COURSE STRUCTURE:

Paper: DCE **Credits:** 3
Max Marks: 75 (**Mid Term:** 25, **End Term:** 35, **Viva:** 10, **Attn. /Assign:** 5)

COURSE OBJECTIVES:

- To learn about streams and how java is using functional programming concepts.
- To learn about database connectivity in java.
- To learn about socket programming in java.
- To learn about Spring Framework in java

COURSE CONTENT:

UNIT I

Streams: stream operations, stream creation, filter map & flatmap methods, extracting substreams & concatenating streams, other stream transformation, simple reductions, the optional type ,collecting results, collecting into maps, grouping & partitioning, downstream collections, reduction operations, primitive type streams, parallel streamsInput & outputi/o streams, text input & output, reading & writing binary data, object i/o streams & serialization.

UNIT II

Networking Connecting to a server, implementing servers, Database Programming JDBC design, structured query language, JDBC Configuration, Working with JDBC statements, query execution, scrollable & updatable result sets, row sets, metadata, transactions, advanced sql type, connection management in web & enterprise applications

UNIT III

Core Spring: Introduction to spring, wiring beans, advanced wiring, aspect oriented spring, Spring on web building, spring web application , Spring in the backend using databases with Spring & JDBC, persisting database with object relational mapping, advanced spring MVC, working with spring web flow , securing web applications.

TEXT BOOKS:

1. Core Java Volume 11-Advanced features by Cay S.horstman 10th edition Publisher: Prentice Hall Spring in Action, Fourth Edition

REFERENCES:

1. Pro Spring 5 Authors: Cosmina, I., Harrop, R., Schaefer, C.
2. Spring Boot in Action by Craig Walls