

# Semester - I

# MSc IT Syllabus – Department of Computer Science, IUST

<b>Semester-I (24 Credit Semester)</b>						
Course Code	Course name	Paper category	Hours / Week			Credits
			L	T	P	
<b>16 Core Credit Units</b>						
MIT-1T1-C	Advanced Programming Concepts in C / C++	Core	3	0	2	4
MIT-1T2-C	Database Management System	Core	3	0	2	4
MIT-1T3-C	Discrete Mathematics	Core	4	0	0	4
MIT-1T4-C	Fundamentals of IT	Core	4	0	0	4
<b>6 Elective Credit Units</b>						
MIT-1E1-DCE	Digital Electronics	DCE	3	0	0	3
MIT-1E2-DCE	Elements of Business Management	DCE	3	0	0	3
MIT-1E3-DCE	E-Commerce	DCE	3	0	0	3
MIT-1E4-DCE	Technical Communication	DCE	3	0	0	3
<b>2 credit units to be taken from outside departments</b>						

**Course No: MIT-1T1-C**

**Course Title: Advanced Programming Concepts in C / C++**

## **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, ?:, SWITCH CASE.

**Looping Constructs:** FOR, WHILE, DO-WHILE, EXIT, BREAK, CONTINUE

## **UNIT II**

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

**Arrays:** Types of arrays, initialization, passing arrays to functions, dynamic arrays. Character Arrays & Strings. String-handling functions. **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

## **UNIT III**

**Structures and Unions:** Syntax & use, members, structures & pointers, array of structures, structures & functions, structure within structures.

**OOPS:** Evolution and need of C++, Advantages over Procedural programming, Introduction to classes and objects, Basic OOPS programming, Constructors and Destructors, Copy Constructors.

## **UNIT IV**

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

**Files:** File processing in C & C++.

**Templates:** Concepts, Function & Class templates, Standard Template library: Containers, Algorithms, Iterators and Function objects.

## **TEXT BOOKS:**

1. Dietel & Dietel, “How to program”, Pearson Education
2. Robert Lafore, “Object Orientation with C++ Programming”, **Waite Group**

## **REFERENCES:**

1. Herbert Schildt, “C++ The Complete Reference”, Tata McGraw Hill
2. Dennis **Richie & Kernighan**, “C Programming Language”, **Prentice Hall**

**Course No: MIT-1T2-C**

**Course Title: Database Management System**

## **UNIT I**

Basic Concepts and Conceptual Database Design: Database Users, Characteristics of the Database, Advantage of using Database Systems, Data Models, schemas and 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 and Relationships, Cardinality of Relationships, Strong and 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. Case Study – ORACLE.

## **UNIT III**

Functional Dependencies & Normalization for Relational Databases: Functional Dependencies, Normal Forms based on primary keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependencies.  
Case Study – Table Normalization.

## **UNIT IV**

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

## **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 and 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 No: MIT-1T3-C**  
**Course Title: Discrete Mathematics**

## **UNIT I**

Sets: Review of set concepts & operations on sets. Functions: Domain, Range, One-to-One, Onto, Inverses and Composition, One-to-One Correspondence and 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 and Truth Tables. Equivalence and 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 and Multiplication Rules, The Pigeon-Hole Principle . Permutation & combinations. Relations and digraphs, Properties of relations, Binary Relations, Equivalence relations, Matrix representation of relations and digraphs, Computer representation of relations and digraphs, Recurrence relations and 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 and applications: Monoids, semigroups, Product and quotients of algebraic structures, Isomorphism, homomorphism, automorphism, Normal subgroups, Codes and group codes.

## **UNIT IV**

Overview of Formal Languages: Representation of special languages and grammars, finite state machines. Graph theory: Definition, paths, circuits, reachability, connectedness. Matrix representation of graphs, trees, tree traversal, trees and sorting, spanning trees, minimal spanning trees, Transitive closure, Warshall's Algorithms, Eulerian and Hamiltonian graphs, graph coloring, Storage representations of graphs.

## **REFERENCES:**

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

**Course No: MIT-1T4-C**  
**Course Title: Fundamentals of IT**

## **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.

## **UNIT III**

Data communication: Definition, criteria, process of communication, types of computer networks. Concept of LAN, MAN and WAN. Transmission media: guided and unguided media. Internet basics, internet protocols, browsers, WWW, email, Telnet, FTP, benefits of Internet and Limitations.

## **UNIT IV**

Latest IT trends- Electronic E conferencing and Teleconferencing, E commerce, AI( Artificial Intelligence), Geographic information system( GIS). Role of IT in different areas- Education, industry, banking, marketing.

## **REFERENCES:**

1. P. K. Sinha , “Computer Fundamentals, 2005”, BPB, New Delhi.
2. V. RajaRaman, ”Introduction to computers”, TMH

**Course No: MIT-1E1-DCE**

**Course Title: Digital Electronics**

## **UNIT I**

Introduction- Digital Systems; Data representation and coding. Number Systems and Codes- Positional number system; Binary, octal and hexadecimal number systems; Methods of base conversions; Binary, octal and hexadecimal arithmetic; Representation of signed numbers; Fixed and floating point numbers; Binary coded decimal codes; Gray codes; Error detection and correction codes - parity check codes and Hamming code.

## **UNIT II**

Combinatorial Logic- Definition and specification; Truth table; Basic logic operation and logic gates. Boolean Algebra and Switching Functions- Basic postulates and fundamental theorems of Boolean algebra; Standard representation of logic functions - SOP and POS forms; Simplification of switching functions - K-map and Quine-McCluskey tabular methods; Synthesis of combinational logic circuits.

## **UNIT III**

Sequential Logic - Definition and Basic sequential circuits- latches and flip-flops: SR-latch, D-latch, D flip-flop, JK flip-flop, T flip-flop; Timing hazards and races; timing specifications, asynchronous and synchronous counters, counter design with state equations, Registers , serial in serial out shift registers, tri-state register.

## **TEXTBOOKS:**

1. Morris Mano, “Digital Design” PHI
2. “Digital Electronics”, Bignill& Donovan.
3. “Digital Integrated Circuit” A.K.Gautam-Katson Publication.

## **REFERENCES:**

1. Taub and Schilling “Digital Integrated Electronics”,TMH
2. Bartee , Thomas C. / “Fundamentals of Digital Computers”/ Tata McGraw-Hill
3. Gopalan, K. “Gopal” / “Introduction To Digital Microelectronic Circuits” / Tata McGraw-Hill
4. Millman, Jacob&Taub, Herbert / “Pulse, Digital & Switching Waveforms” / Tata McGraw-Hill
5. Malvino, A.P. & Leach, Donald P. / “Digital Principles & Applications” / Tata McGraw-Hill
6. Tokheim, H. Roger L. / “Digital Electronics Principles & Application”/ Tata McGraw-Hill / 6th Ed.

**Course No: MIT-1E2-DCE**  
**Course Title: Elements of Business Management**

## **UNIT I**

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

## **UNIT II**

Motivation: meanings and approaches. Work motivation. The content theories of work motivation – Maslow’s Need Hierarchy theory; Herzberg’s motivation theory; meaning of leadership, theories of leadership- trait and situational theories. Management control and audits; accounting audit. The management audit; purpose and scope.

## **UNIT III**

Individual decision making and problem solving; Understanding and managing Group Processes Interpersonal and Group dynamics. Concept: Leadership skills; Theories of Leadership; Trait theory; Situation theory; Path- Goal leadership Model; Understanding and Managing Organizational System; Organizational Design Structure.

## **REFERENCES:**

1. George R. Terry and Stephan G. Franklin, “Principles of Management”.
2. Banerjee shyam, “principles and practices of management”.
3. Knootz, Harold and C.O. Dinell, “Management a system contingency analysis of managerial functions”.

**Course No: MIT-1E3-DCE**

**Course Title: E-Commerce**

## **UNIT I**

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

The Internet and WWW - Evolution of Internet, Domain Names and 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 and 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 and 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 and electronic publishing

## **REFERENCES:**

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

**Course No: MIT-1E4-DCE**  
**Course Title: Technical Communication**

## **UNIT I**

Technical Communication: Basics of Technical Communication, Barriers to Communication & Technology in Communication. Communicating 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 & implications of good listening.

## **UNIT II**

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

## **UNIT III**

Paragraph Development: Central components of a paragraph, length of a paragraph and techniques for paragraph development. The art of condensation, steps for effective précis writing, samples & guidelines. Memo reports: Purpose of memo reports, elements of a usable memo, interpersonal considerations in writing a memo, common types of memo report. Letters & Employment correspondence: Application letters and business correspondence, How applicants are screened for personal qualities, electronic job hunting.

## **REFERENCES:**

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