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/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

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 - 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/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/C++	**Course Code:**	MIT-1T1-C
Semester:	1st	**Paper Type:**	Core
Credits:	05	**Max Marks:**	125
Pre Requisite:	--------	**Co-Requisite:**	MIT-1T3-C

Marks Distribution: (Mid Term:30, End Term:50, Lab:25, Viva:10, Assignment / Presentations: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, Standard Template library: Containers, Algorithms, Iterators and Function objects.

COURSE OUTCOMES:

At the end of the course student will be able to:

- *Formulate simple algorithms for arithmetic and logical problems, translate the algorithms to programs (in C language).*
- *Test and execute the programs and correct syntax and logical errors.*
- *Develop efficient algorithms for solving a problem and implementation.*
- *Use the various constructs of a programming language viz. conditional, iteration and Recursion.*

Text Books:

1. Programming in ANSI C 6th Edition "E. Balaguruswamy"
2. Robert Lafore, "Object Orientation with C++ Programming", Waite Grou

References:

1. Object Oriented Programming with C++ " E. Balagurusamy"
2. Herbert Schildt, "C++ The Complete Reference", Tata McGraw Hill
3. Dennis Richie & Kernighan, "C Programming Language", Prentice Hall
4. Dietel & Dietel, "How to program", Pearson Education

Course Title: Database Management System
Semester: 1st
Credits: 05
Pre Requisite: ----------
Course Code: MIT-1T2-C
Paper Type: Core
Max Marks: 125
Co-Requisite: MIT-1T1-C, MIT-1T3-C
Marks Distribution: (Mid Term:30, End Term:50, Lab:25, Viva:10, Assignment / Presentations: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".

UNIT III

Functional Dependencies & Normalization for Relational Databases: Functional Dependencies, Normal Forms based on primary keys, General Definitions of Second & Third Normal Forms, Boyce-Codd Normal Form, and Multivalued Dependencies.
"Mini Project: Data Analysis and Data Modelling"

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, Distributed Data Base Management Systems.

COURSE OUTCOMES:

At the end of the course student will be able to:

- *Introduces the role of a database management system, basic database concepts, including the structure and operation of the relational data model.*
- *Familiarize themselves with the concepts of integrity constraints, relational algebra, relational domain & tuple calculus, data normalization.*
- *Construct simple and moderately advanced database queries using Structured Query Language (SQL).*
- *Have knowledge of database transaction including concurrency control, backup and recovery, and data object locking.*
- *Design and implementation of a small database project using Oracle.*

Text Books:

1. Korth, Silberschatz, "Database System Concepts", TMH
2. Elmsari & Navathe, "Fundamentals of Database Systmes", A. Wesley
3. Ullman J. D., "Principles of Database Systems", Galgotia Publications

References:

1. Steve Bobrowski, "Oracle 8 Architecture", TMH
2. Date C. J., "An Introduction to Database Systems",Narosa Publishing
3. William Page, "Using Oracle 8i – Special Edition", Que/PHI
4. Ivan Bayross, "SQL & PL/SQL Using Oracle 8i & 9i with SQLJ", BPB
5. Desai.B, "An introduction to Database Concepts", Galgotia Publications

Course Title:	Discrete Mathematics	**Course Code:**	MIT-1T3-C
Semester:	1st	**Paper Type:**	Core
Credits:	04	**Max Marks:**	100
Pre Requisite:	--------	**Co-Requisite:**	MIT-1T1-C

Marks Distribution: (Mid Term:30, End Term:50, Viva:10, Assignment / Presentations: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.

COURSE OUTCOMES:

At the end of the course student will be able to:

- *Develop mathematical and logical thinking*
- *Express real life problems it in terms of predicates, quantifiers, and logical connectives and obtained its solution*
- *Utilize the concepts of relations and functions to solve simple real life problems.*

Text Books:

1. KENNETH H. ROSEN "Discrete Mathematics & Its Applications, Tata McGraw – Hill
2. Ralph P. Grimaldi, Discrete And Combinatorial Mathematics An Applied Introduction

References:

1. LIU "Elements of Discrete Mathematics " Tata McGraw Hill
2. SCHAUMS "Discrete Mathematics" Tata McGraw Hill
3. KOLMAN/REHMAN "Discrete Mathematical Structures" Pearson Education
4. NICODEMI "Discrete Mathematics" CBS

Course Title:	Technical Communication	**Course Code:**	MIT-1T4-C
Semester:	1st	**Paper Type:**	Core
Credits:	04	**Max Marks:**	100
Pre Requisite:	--------	**Co-Requisite:**	MIT-1T3-C

Marks Distribution: (Mid Term:30, End Term:50, Viva:10, Assignment / Presentations: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.

COURSE OUTCOMES:

At the end of the course, students will demonstrate proficiency by:

- *Understanding the characteristics of technical writing and the importance of purpose, audience, and genre for written communication in technical fields.*
- *Articulating complex engineering ideas appropriate for targeted audiences.*
- *Planning, drafting, revising, editing, and critiquing technical and professional documents through individual and collaborative writing.*
- *Writing effective technical and business documents that are grammatically and stylistically correct.*
- *Preparing and delivering professional technical presentations through applying principles of effective oral communication and slide design.*
- *Applying principles for the visual display of quantitative information.*
- *Researching, analyzing, synthesizing, and applying information to create technical reports.*
- *Recognizing ethical implications of technical communication in professional contexts.*
- *Understanding the contemporary issues in engineering from an environmental, societal, economic, and global perspective.*

Text Books:

1. William Pfeiffer, Padmaja,"Technical Communication A Practical Approach", Pearson Education.

References:

1. Meenakshi Raman & Sangeeta Sharma,"Technical Communication",Oxford University Press

Course Title:	Digital Electronics	**Course Code:**	MIT-1E1-DCE
Semester:	1st	**Paper Type:**	DCE
Credits:	03	**Max Marks:**	75
Pre Requisite:	--------	**Co-Requisite:**	MIT-1T4-C, MIT-1T2-C

Marks Distribution: (Mid Term:25, End Term:35, Viva:05, Assignment / Presentations:10)

COURSE OBJECTIVE:

- *To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.*
- *To prepare students to perform the analysis and design of various digital electronic circuits.*
- *The course also covers digital logic design intended to make students familiar with different types of designs as sequential logic circuits and combinational logic circuits.*

COURSE CONTENT:

UNIT I

Introduction- Digital Systems; Data representation & coding. Number Systems & Codes- Positional number system; Binary, octal & hexadecimal number systems; Methods of base conversions; Binary, octal & hexadecimal arithmetic. Minimization Techniques: Boolean postulates & laws – De-Morgan"s Theorem - Principle of Duality -Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don"t care conditions – Quine - McCluskey method of minimization.

UNIT II

Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.

UNIT III

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

COURSE OUTCOMES:

At the end of the course, students will be able to:

- *To understand and examine the structure of various number systems and its application in digital design.*
- *Understand, analyze and design various combinational and sequential circuits.*
- *Identify basic requirements for a design application and propose a cost effective solution.*
- *Identify and prevent various hazards and timing problems in a digital design.*
- *To develop skill to build, and troubleshoot digital circuits*

Text Books:

1. Digital Fundamentals, Global Edition (Kindle Edition) by Thomas L Floyd.

References:

1. Modern Digital Electronics, 3rd Edition by R.P Jain
2. Digital Electronics: principles, Devices & Applications, Wiley by Anil K Maini.

Course Title:	E-Commerce	**Course Code:**	MIT-1E2-DCE
Semester:	1st	**Paper Type:**	DCE
Credits:	03	**Max Marks:**	75
Pre Requisite:	--------	**Co-Requisite:**	MIT-1T4-C , MIT-1E1-DCE

Marks Distribution: (Mid Term:25, End Term:35, Viva:05, Assignment / Presentations:10)

COURSE OBJECTIVES:

- *To provide basic concepts of e-business and e-commerce, including presentation and discussion of the strategies and technologies involved.*
- *To provide theoretical and practical issues of conducting business over the internet and the Web*
- *To present methods for evaluating user needs.*
- *To provide an understanding of E-business Infrastructure, Selling and Marketing on the Web, Web Server Hardware and Software, Business-to-Business strategies, Virtual Communities, Web Portals, E-commerce Software, Payment systems, Security and User Experience.*

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

COURSE OUTCOMES:

At the end of the course student will be able to:

- *Understand the basic business management concepts, technical concepts, legal issues, and privacy relating to E-commerce.*
- *Understand how E-commerce is affecting business enterprises, governments, consumers and people in general.*
- *Describe the infrastructure needed for E-commerce and various electronic payment systems.*

Text Books:

1. E-Commerce Concepts, Models, Strategies by G.S.V Murthy
2. E commerce: by Laudon

References:

1. E-Commerce by Kamlesh K Bajaj and Debjani Nag
2. Electronic Commerce by Gary P. Schneider

Course Title:	Fundamentals of IT	**Course Code:**	MIT-1E3-DCE
Semester:	1st	**Paper Type:**	DCE
Credits:	03	**Max Marks:**	75
Pre Requisite:	--------	**Co-Requisite:**	MIT-1E1-DCE, MIT-1E2-DCE

Marks Distribution: (Mid Term:25, End Term:35, Viva:05, Assignment / Presentations:10)

COURSE OBJECTIVE:

The course introduces the students to basic computer concepts. Emphasis of the course is on providing the students with an introduction to programming, programming paradigms, database, basic networking and security. The course also covers digital logic design intended to make students familiar with different types of designs as sequential logic circuits and combinational logic circuits. Widely used software's including word processing, spreadsheets and presentations are studied. Main objectives of the course are to build an appreciation for the fundamental concepts of computers and to become familiar with popular PC productivity software.

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.

COURSE OUTCOMES:

At the end of the course student will be able to:

- *Understand the basic concepts of computer and its component*
- *Relate theory and practice of computer architecture*
- *Illustrate the basic data representation in the computer*
- *Comprehend the organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit*

Text Books:

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