Bridge Course

(Computer Science and IT Track)

Overview:
This Bridge Course is intended to provide you with an overview of a wide range of Computer Science and Information Technology topics, including Computer Architecture, Operating Systems, Data Structures, Database Management Systems, Networking, and Basic Mathematics.

Course Duration:
6 Weeks

Mode of Delivery:
Online

Medium of Instruction:
English

For Whom:
For students enrolled in MCA Program (Online Mode). It is mandatory for all the students enrolled into the MCA Program to complete the requirements of the Bridge Course.

No. of Units:
15

Pedagogy:

1. Live Online Sessions	24 hours
2. LinkedIn Learning Courses	25 hours
3. Self-Learning Material	26 hours
4. Self-Assessment Activity	5 hours
	80 hours

Course Pack:

1. Access to Learning Management System Account
2. e-copy of Self-Learning Material (PPTs)
3. Live Sessions
4. Recording of the live sessions
5. LinkedIn Learning Courses
6. Self-Assessment Questions: MCQ type

Attendance Requirement:
Minimum of 75%

Assessment Components and Weightage:
100 Marks; Continuous Assessment (50%) and End-of-Course Assessment (50%)

Continuous Assessment Components:
2 Assignments of 25 Marks each; MCQ pattern; Online on LMS

End-of-Course Assessment:
50 Marks; MCQ Pattern; Online on LMS and Non-Proctored

Minimum for Pass:
40% each in Continuous and End-of-Course components

Bridge Course Syllabus
(Computer Science and IT Track)

Course Outcomes

CO1: Determine the key building blocks of IT and identify the relevance of each component in problem-solving.
CO2: Interpret the working of Operating systems, Computer Memory, Networks and Databases.
CO3: Develop foundational skills in mathematics and comprehend its application in the computer science domain.
CO4: Infer the data structure principles.
CO5: Apply methodologies of C programming.

Unit 1: Introduction to Computer Architecture

Basic Computer Structure: Computer Types, Evolution of Computer architecture, Functional Units, Basic Operational Concepts, Bus & Registers, Classifying Instruction Set Architecture, Instruction Cycle

Learning Outcome: *Develop insight on computer architectural framework.*

Unit 2: Computer Memory

Basic Concepts of Memory & Memory functions, Semiconductor RAM Memories, Read Only Memories (ROM), Types of Memory, Cache Memory, Virtual Memory

Learning Outcome: *Determine the relevance of memory circuits and organization of main memory.*

Unit 3: Operating Systems – I

Operating Systems: Introduction, Types of Operating Systems, Operating System structure, Operating System operations. System calls, Types of System Calls, Operating System Generation

Learning Outcome: *Determine the fundamentals of Operating System and System Calls.*

Unit 4: Operating Systems – II

Process Concept: Introduction, Inter Process Communication (IPC), Introduction to Multithreaded Programming

Process Scheduling: Basic Process Concepts, Process Scheduling Criteria, Scheduling Algorithms

Learning Outcome: *Understand the concept of Process Management, Scheduling and Multithreaded Programming.*

Unit 5: Concepts of Data Structures – I

Introduction to Data Structures, Need of Data Structure, Classifications (Primitive & Non-Primitive), Linear & Non-Linear Data Structures, Data structure Operations

Algorithm: Introduction, Characteristics of Algorithm, Elements of Algorithm

Learning Outcome*: Determine the vital role played by data structures in problem solving.*

Unit 6: Concepts of Data Structures – II

Pointers: Pointer Basics, Pointer with Functions, Pass by Reference, Array of Pointers & Pointer to Array

Array: Introduction, Representation of Linear Arrays in Memory, Dynamically Allocated arrays. Traversing, Inserting, Deleting, Searching, & Sorting of Arrays

Introduction to Strings, Storing Data, String Manipulation Functions

Learning Outcome: *Determine the relevance of Pointers and learn to implement Arrays and its operations in programs.*

Unit 7: Introduction to Matrix Theory

Definition a matrix as rectangular arrangement, Types of matrices - column matrix, row matrix, rectangular matrix, square matrix, zero matrix, diagonal matrix, scalar matrix and unit matrix, Algebra of matrices - Equality of matrices, Addition, multiplication, scalar multiplication of matrices, Transpose of a matrix, Introduction to elementary operations and finding inverse of a matrix using elementary operations

Learning Outcome: *Comprehend the fundamental concepts of Matrix Algebra and to apply it find inverse of a matrix.*

Unit 8: Introduction to Mathematical Logic

Sets and Subsets, set operations and the Laws of Set theory, Counting and Venn diagram, Fundamentals of Logic, Basic connectives- Truth Tables, logical equivalences

Learning Outcome: *Get familiar with the notion of a set, operations on it and get to know the construction of truth tables.*

Unit 9: Introduction to the Principles of Counting

Permutations, Combinations, The rules of Sum and Product, Permutation with repetition, Combination with repetition, Binomial Theorem

Learning Outcome: *Solve discrete mathematics problems that involve computing permutations and combinations.*

Unit 10: Essentials of Computer Networks

Introduction to Network, Network Components, Network Classifications, Data Representation and Data Flow: Simplex, Half Duplex, Full Duplex, Network Protocol,

Layered Network Architecture, Overview of OSI Reference Model, Overview of TCP/IP Protocol Suite

Learning Outcome: *Determine the fundamentals concepts of networks and infer the role played by various layers of network reference models in data transmission.*

Unit 11: Fundamentals of Database Management Systems

Introduction, File Based Systems, Disadvantages of Files Systems, Characteristics of Databases, Data Processing, Types of Data Processing, Access Methods, Evolution of Databases, Advantages of DBMS, Comparing DBMS & RDBMS, Applications of Databases

Learning Outcome: *Develop an insight on the features & purpose of database management systems.*

Unit 12: Database Models & Architecture

Database Model, Database Instance, Schemas, Three Level Schema Architecture, Data Abstraction & Data Independence, Database Languages (DDL, DML, DCL & TCL), Database System Environment, Data Dictionary

Learning Outcome: *Assess the evolving nature of data models over the years & appreciate the current architecture of DBMS.*

Unit 13: Programming with C – I

Software, Classification of Software, Modular Programming, Structured Programming, History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants, Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions

Learning Outcome: *Comprehend the core concepts of C programming.*

Unit 14: Programming with C – II

Managing Input and Output Operation: Formatted and Unformatted I/O Functions, Decision making, Branching and Looping: Decision Making Statements - if Statement, if–else statement, nesting of if-else statements, else–if ladder, Switch statement, Operator, Looping - while, do-while, for loop, Nested loop, Break, Continue, and goto statements

Learning Outcome: *Infer & implement the input output operations for developing programs in C.*

Unit 15: Programming with C – III

User-Defined Functions: Introduction, Purpose and Elements of User-Defined Functions, Return Values and their types, Function Calls, Declarations, Category of Function, Nesting of Functions

Learning Outcome: *Design & implement programs using the C functions.*