

**MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL**  
**(Formerly West Bengal University of Technology)**

Syllabus of B.Sc. In IT (Data Science)  
 (Effective from 2023-24 Academic Sessions)

**Curriculum Structure**

**SEM-I**

Sl.	Course Type	Code	Course Name	Credits			Total Credits
				L	T	P	
1	Major	BSCITD SM101	Fundamental of Programming using C	3	0	2	5
		BSCITD SM191	Fundamental of Programming using C lab				
2	Major	BSCITD SM102	Introduction to Digital Electronics	3	0	2	5
		BSCITD SM192	Digital Electronics Lab				
3	Minor	MIM101	Principles of Management	3	0	0	3
4	GE		Anyone from GE Basket A or D	3	0	0	3
5	AECC	AECC101	English & Professional Communication	2	0	0	2
6	SEC	SEC101	Life Skills & Personality Development	2	0	0	2
7	VAC	VAC181A	Yoga	2	0	0	2
		VAC181B	Health & Wellness				
		VAC181C	Sports				
Total Credits							22

**Course:** Fundamental of Programming using C /Fundamental of Programming using C lab

**Credits:** 3L + 2P

**Course Code:** BSCITDSM101/BSCITDSM191

**COURSE OBJECTIVE:**

The objective of the course “Fundamental of Programming using C” is to equip students with fundamental programming skills using the C programming language and foster a problem-solving mindset. Throughout the course, students will develop a solid foundation in computer programming concepts and techniques, enabling them to tackle real-world problems and develop efficient, structured, and modular solutions.

<b>COURSE OUTCOME</b>	
CO1	Apply programming constructs of C language to solve the real world problem
CO2	Implement conditional branching, iteration and recursion
CO3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
CO4	Explore user-defined data structures like structures, unions and pointers in implementing solutions
CO5	Create problem-solving solutions utilizing modular programming elements and functions
CO6	Use secondary memory to store information after solving the problem related to the real world

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**Module 1: Introduction to Principles of programming**

Introduction to Programming, Programming Domain: Scientific Application, Business Applications, Artificial Intelligence, Systems Programming, and Web application Categories of Programming Languages: Machine Level Languages, Assembly Level Languages and High Level Languages.

**Module 2: Introduction to C Programming**

Features of C and its Basic Structure, Simple C programs, Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to Variables.

**Module 3: Operators and Expressions**

Arithmetic Operators, Unary Operators, Relational and Logical Operators, The Conditional Operator, Library Functions, Bitwise Operators, The Increment and Decrement Operators, The Size of Operator, Precedence of operators.

**Module 4: Data Types and Input/output Operators**

Floating-point Numbers, Converting Integers to Floating-point and vice-versa, Mixed-mode Expressions, The type cast Operator, The type char, Keywords, Character Input and Output, Formatted input and output, The gets() and puts() functions, Interactive Programming.

**Module 5: Control Statements and Decision Making**

The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break statement and continue statement, The goto statement.

**Module 6: Arrays and Strings**

One Dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays Strings - Concepts, C Strings, String Input/output Functions, Arrays of Strings, String Manipulation Functions.

**Module 7: Pointers**

Pointers for Inter-Function Communication, Pointers to Pointers, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions.

**Module 8: Structures and Unions**

Basics of Structures, Arrays of Structures, Pointers to Structures, Self-referential Structures, Unions

**Module 9: Functions**

Function Basics, Function Prototypes, and Passing Parameters: Passing Parameter by value and Passing Parameter by reference, passing string to function, Passing array to function, Structures and Functions Recursion

**Module 10: Storage Classes**

Storage Classes and Visibility, Automatic or local variables, Global variables, Static variables, External variables

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**Module 11: Dynamic Memory Allocation**

Dynamic Memory Allocation, Allocating Memory with malloc, Allocating Memory with calloc, Freeing Memory, Reallocating Memory Blocks

**Module 12: File Management**

Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Random Access to Files

**List of Practical**

1. Write a c program to display the word "welcome".
2. Write a c program to take a variable int and input the value from the user and display it.
3. Write a c program to add 2 numbers entered by the user and display the result.
4. Write a c program to calculate the area and perimeter of a circle.
5. Write a C program to find maximum between two numbers.
6. Write a C program to check whether a number is divisible by 5 and 11 or not.
7. Write a C program to input angles of a triangle and check whether triangle is valid or not.
8. Write a C program to check whether a year is leap year or not.
9. Write a C program to input basic salary of an employee and calculate its Gross salary according to following:  
Basic Salary  $\leq$  10000 : HRA = 20%, DA = 80%  
Basic Salary  $\leq$  20000 : HRA = 25%, DA = 90%  
Basic Salary  $>$  20000 : HRA = 30%, DA = 95%
10. Write a c program to print "welcome" 10 times.
11. Write a c program to print first n natural numbers using while loop.
12. Write a c program to print all the odd numbers in a given range.
13. Write a c program to add first n numbers using while loop.
14. Write a c program to print all numbers divisible by 3 or 5 in a given range.
15. Write a c program to add even numbers in a given range.
16. Write a c program to find the factorial of a given number.
17. Write a c program to find whether a number is prime or not.
18. Write a c program to print the reverse of a number.
19. Write a c program to add the digits of a number.
20. Write a c program to print the Fibonacci series in a given range using recursion.
21. Write a c program to check whether a number is an Armstrong number or not.
22. Write a c program to find g.c.d. and l.c.m. of two numbers using function.

**Text Books:**

1. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw Hill.
2. B. Gottfried, "Programming in C", Second Edition, Schaum Outline Series.
3. R.S. Salaria, "Problem Solving and Programming in C", Khanna Publishing House
4. E. Balagurusamy, "Programming in ANSI C", Eighth Edition, McGraw Hill.

**Reference Books:**

1. B. W. Kernighan and D. M. Ritchi, The 'C Programming Language', Second Edition, PHI.
2. Yashavant Kanetkar, "Let Us C", BPB Publication

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**Course:** Introduction to Digital Electronics/ Digital Electronics Lab

**Credits:** 3L + 2P

**Course Code:** BSCITDSM102/ BSCITDSM192

**COURSE OBJECTIVE:**

The objective of the course "Introduction to Digital Electronics" is to provide students with a comprehensive understanding of the principles, theory, and practical applications of digital circuits and systems. Throughout the course, students will explore the foundational concepts of digital electronics, enabling them to design, analyze, and troubleshoot digital circuits commonly used in various electronic devices and systems.

<b>COURSE OUTCOME</b>	
CO1	Understand the fundamental of digital systems.
CO2	Solve different type of codes and number systems which are used in digital communication and computer systems.
CO3	Analyze Boolean laws and K-map to simplify the digital circuits.
CO4	Apply the various digital Combinational circuits and their operation
CO5	Apply the various digital Sequential Circuits and their operation

**Module 1: Number Systems & Codes**

Decimal Number, Binary Number, Octal Number, Hexadecimal Number, Conversion – Decimal to Binary, Binary to Decimal, Octal to Binary, Binary to Octal, Hexadecimal to Binary, Binary to Hexadecimal, Octal to Binary to Hexadecimal, Hexadecimal to Binary to Octal; Floating Point Number Representation, Conversion of Floating Point Numbers, Binary Arithmetic, 1's and 2's Complement, 9's and 10's Complement, Complement Arithmetic, BCD, BCD addition, BCD subtraction, Weighted Binary codes, Non-weighted codes, Parity checker and generator, Alphanumeric codes

**Module 2: Logic Gates**

OR, AND, NOT, NAND, NOR, Exclusive – OR, Exclusive –NOR, Mixed logic.

**Module 3: Minimization Techniques**

Sum of Products, Product of Sums, Karnaugh Map [up to 4variables].

**Module 4: Multilevel Gate Network**

Implementation of Multilevel Gate Network, Conversion to NAND-NAND and NOR-NOR Gate Networks.

**Module 5: Arithmetic Circuits**

Half Adder, Full Adder, Half Subtractor, Full Subtractor, Carry Look Ahead Adder, 4-Bit Parallel Adder.

**Module 6: Combinational Circuits**

Basic 2-input and 4-input multiplexer, De-multiplexer, Basic binary decoder, BCD to binary converters, Binary to Gray code converters, Gray code to binary converters, Encoder.

**Module 7: Sequential Circuits**

Introduction to sequential circuit, Latch, SR Flip Flop, D Flip Flop, T Flip Flop, JK Flip Flop, Master Slave Flip Flop, Conversion of Flip Flop.

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**Module 8: Basics of Counters**

Asynchronous [Ripple or serial] counter, Synchronous [parallel] counter.

**Module 9: Basics of Registers**

SISO, SIPO, PISO, PIPO, Universal Register.

**List of Practical**

1. Realization of basic gates using Universal logic gates.
2. Code conversion circuits- BCD to Excess-3 and viceversa.
3. Four-bit parity generator and comparator circuits.
4. Construction of simple Decoder and Multiplexer circuits using logic gates.
5. Design of combinational circuit for BCD to decimal conversion to drive 7-segment display using multiplexer.
6. Construction of simple arithmetic circuits-Adder, Subtractor.
7. Realization of RS-JK and D flip-flops using Universal logic gates.
8. Realization of Universal Register using JK flip-flops and logic gates.
9. Realization of Universal Register using multiplexer and flip-flops.
10. Realization of Asynchronous Up/Down counter.
11. Realization of Synchronous Up/Down counter.
12. Realization of Ring counter and Johnson's counter.
13. Construction of adder circuit using Shift Register and full Adder.

**Text Books:**

1. DIGITAL DESIGN – Third Edition , M.Morris Mano, Pearson Education/P
2. Digital Circuits, Vol - I & II, D. Ray Chaudhuri, Platinum Publishers.
3. Digital Systems - Principle & Applications, Tocci & Widmer, EEE

**Reference Books:**

1. Fundamentals of Digital Circuits - Fourth edition, Kumar A. Anand, PHI.