Semester II

Programming in C

Course Code	Teaching hours per week				Credits	Exam Hours	Course Type	CIE Marks	ESE Marks
	L	T	P	R					
26ABNES202	2	1	0	0	3	2 Hrs. 30 Mins	Theory	40	60

1. **Preamble :** This course introduces students to the fundamental concepts of programming using C, including data types, operators, control structures, functions, arrays, pointers, structures, file handling and modular program design. Through hands-on programming practice, students gain the ability to translate real-world problems into efficient and logical C programs.
2. **Prerequisites :** NIL

Syllabus

Module Number	Syllabus Description	Contact Hours
1	**C Fundamentals** - Character Set, Constants, Identifiers, Keywords, Basic Data types, Variables, Operators and its precedence, Bit-wise operators, Expressions; Statements - Input and Output statements; Structure of a C program; Simple programs. **Control Statements** - if, if-else, nested if, switch, while, do-while, for, break & continue, nested loops.	**9**
2	**Arrays** - Single dimensional arrays, defining an array, Array initialization, accessing array elements; Enumerated data type; Type Definition; Two- dimensional arrays – Defining a two-dimensional array; Programs for matrix processing; Programs for sequential search; Bubble sort. **Strings** - Declaring a string variable, Reading and displaying strings, String related library functions – Programs for string matching.	**10**
3	**Functions** - Function definition, Function call, Function prototype, Parameter passing; Recursion; Passing array to function; Macros – Defining and calling macros; Command line Arguments.	**9**

Module Number	Syllabus Description	Contact Hours
	Structures - Defining a Structure variable, Accessing members, Array of structures, Passing structure to function; Union. **Storage Class** - Storage Classes associated with variables: automatic, static, external and register.	
4	**Pointers** - Declaration, Operations on pointers, Passing pointer to a function, Accessing array elements using pointers, Processing strings using pointers, Pointer to pointer, Array of pointers, Pointer to function, Pointer to structure, Dynamic Memory Allocation. **Files**- Different types of files in C, Opening & Closing a file, Writing to and Reading from a file, Processing files, Library functions related to file – fseek(), ftell(), fread(), fwrite().	**9**
	Total hours	**37**

3. **Course Assessment Method**

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE) :

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE) :

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60**

4. Course Outcomes

At the end of the course students should be able to:

Course Outcomes		Blooms Taxonomy Level
CO1	Explain the fundamentals of C programming and structured program development.	K2
CO2	Apply arrays, functions, recursion and strings to develop structured C programs.	K3
CO3	Use abstract data types and storage classes for data organization in C programs.	K3
CO4	Apply pointers, dynamic memory allocation and file handling to develop C programs.	K3

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

5. Mapping of Course Outcomes with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	-	-	-	-	-	-	-	-
CO2	3	3	3	2	2	-	-	-	-	-	2
CO3	3	3	3	2	2	-	-	-	-	-	2
CO4	3	3	3	2	3	-	-	-	-	-	2

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), - : No Correlation

6. Text Books

Sl No	Title of Book	Name of Author/s	Publisher	Edition and Year
1	Schaum's Outline of Programming with C	Byron S Gottfried	Mc Graw Hill Education (India)	2/e, 2022
2	Problem Solving and Program Design in C	Jeri R. Hanly, Elliot B. Koffman	Pearson	8/e, 2016
3	The C Programming Language	Brian W. Kernighan and Dennis Ritchie	Pearson	2/e, 2015

7. Reference Books

Sl No	Title of Book	Name of Author/s	Publisher	Edition and Year
1	Programming in ANSI C	E Balagurusamy	Mc Graw Hill	9/e, 2024

Sl No	Title of Book	Name of Author/s	Publisher	Edition and Year
2	Programming in C	Reema Thareja	Oxford University Press	2/e, 2016
3	C The Complete Reference	Herbert Schildt	Mc Graw Hill	4/e, 2017
4	Let us C	Yashavant Kanetkar	BPB Publishers	19/e, 2022

8. Video Links or any other Reference Materials

Sl No	Details Like Weblink, Publication Details	Module
1	https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs53	1, 2, 3, 4
2	https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_cs40	1, 2, 3, 4

9. Model Question Paper

MODEL QUESTION PAPER			
FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY(FISAT) (Autonomous) FIRST SEMESTER B. TECH DEGREE EXAMINATION (2026 Scheme)			
Course Code : 26ABNES202 Course Name : Programming in C			
Programme : CSE/CSD/ECE/EEE/EIE			
Max. Marks: 60		**Duration: 2 hours 30 minutes**	
PART A			
(Answer all questions. Each question carries 3 marks)		**CO**	**Marks**

1	What will be the output of the following C program? Justify your answer.
	#include <stdio.h>
	int main() {
	int a = 5; // binary: 0101
	int b = 9; // binary: 1001
	printf("%d", a & b);
	return 0;
	}
		CO1	(3)

2	Find out the errors, if any in the following program. Correct the error and justify your answer. Include <math.h> main { } (FLOAT X; X=2.5;	CO1	(3)

		Y=exp(x); Print(x,y);)		
3		Explain enumerated data types with example.	CO2	(3)
4		Write a C program to initialize a 3×3 matrix and display its diagonal elements separately.	CO2	(3)
5		List the four storage classes in C and mention one feature of each.	CO3	(3)
6		Explain with an example how a union saves memory compared to a structure.	CO3	(3)
7		What is the purpose of malloc() and free() functions?	CO4	(3)
8		How do you open a file for reading and writing in C? Write the syntax.	CO4	(3)
PART B				
(Answer any one full question from each module, each question carries 9 marks)				
Module - 1			**CO**	**Marks**
9	a)	Write a C Program to check if a given number is a strong number or not. *Hint : A strong number is a number in which the sum of the factorial of the digits is equal to the number itself.* *Eg:- 145: 1 !+4 !+5!: l +24+120=145*	CO1	(5)
	b)	Write a C program to display the first 50 prime numbers.	CO1	(4)
10	a)	Write a C program to print the sum of n natural numbers. Also count the number of odd numbers in it.	CO1	(3)
	b)	Explain any 3 bitwise operators and 3 logical operators in C with examples.	CO1	(6)
Module - 2			**CO**	**Marks**
11	a)	Write a C program that sorts an array of strings alphabetically using strcmp() and strcpy() functions.	CO2	(6)

	b)	What will be the output of the following C program? Justify your answer.
		#include <stdio.h>
		#include <string.h>
		int main() {
		char str1[10] = "abc";
		char str2[10] = "def";
		strcat(str1, str2);
		printf("%s", str1);
		return 0;
			CO2	(3)

		}		
12	a)	Write a C program that reads a string from the user, counts the number of vowels, consonants, digits and special characters and display the counts separately.	CO2	(5)
	b)	Write a C program to insert a new element into an existing array at a given position, shift the remaining elements accordingly and print the new array.	CO2	(4)
Module - 3			**CO**	**Marks**
13	a)	Write a C program that uses a function to sort an array of integers.	CO3	(5)
	b)	Write a C program to define a structure Book (title, author, price). Write a function to accept and display a book's details.	CO3	(4)
14	a)	Write a C program to find the factorial of a given number using recursion.	CO3	(6)
	b)	Explain the difference between recursion and iteration.	CO3	(3)
Module - 4			**CO**	**Marks**
15	a)	Write a C program to read an array of 5 integers. Use a pointer to find and print the largest element of the array.	CO4	(5)
	b)	Explain any 5 file handling functions in C?	CO4	(4)
16	a)	Write a C program to concatenate two strings using pointers.	CO4	(5)
	b)	Write a C program to read integers from a text file and count how many even and odd numbers are present.	CO4	(4)

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