

**Institute of Engineering & Technology, Lucknow-226021(UP)**  
**Department of Computer Science and Engineering (SE)**  
**Programming for Problem Solving (ICS-201)**

**CT2 Session 2023-24 Course: B.Tech. Semester: II**

**Duration: 1 hour**

**Max. Marks: 20**

Attempt all questions.

<b>S.No.</b>	<b>Question</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
1	Write a C program to find the transpose of a matrix.	5	CO3	3
2	Explain enumerated data type. Write a program in C to display the week days using enumerated data type.	5	CO3	3
3	What are the types of recursion? Also, write a recursive function in C to compute factorial for a given integer.	5	CO4	3
4	Explain the difference between the two methods of parameter passing in a function using program in C.	5	CO4	3

**B.Tech.**  
**(SEM I) ODD SEMESTER EXAMINATION 2022-23**  
**PROGRAMMING FOR PROBLEM SOLVING**

[TIME: 3 hrs.]

[Max. Marks: 70]

Note: Attempt All Questions. All Question carry equal marks.

- |     |  |       |
|-----|--|-------|
| Q1. | Answer ALL parts.  | Marks |
| (a) | Draw the block diagram of a digital computer and explain its components. | 3.5   |
| (b) | Define an algorithm. Describe the characteristics of an algorithm.       | 3.5   |
| (c) | Discuss the basic elements of the computer memory hierarchy.             | 3.5   |

**OR**

- (d) Describe the need of an operating system and explain the functions performed.
- (d) Outline the structure of the C program. 3.5

**OR**

✓ Differentiate between interpreter and compiler.

- Q2. Answer ALL parts.
- (a) List and describe different operators used in C program. Compute the output of the following C program. 7

```
#include <stdio.h>
void main ()
{
    int a =10, b=2, x=0;
    x = a + b * a + 10 / 2 * a;
    printf("value is = %d", x);
}
```

- (b) Draw the flow chart of nested *if – else* statement. Write a C program to print the division obtained by the student as per the following rules: 7
- Marks above or equal to 60: I division  
Marks between 50 to 59: II division  
Marks between 40 to 49: III division  
Marks less than 60: Fail.

**OR**

✓ Describe the role of *switch – case* statement in C programming language. Write a program to check whether a number is positive, negative or zero using *switch – case*.

**Q3.** Answer ALL parts.

- (a) ✓ Define loop and its types. Write a program in C to display the Fibonacci sequence. 7
- (b) ✓ Define an array. Explain different types of arrays and their declaration. Write a C program to find the multiplication of two 3 x 3 matrices. 7

**OR**

Define a structure in C. Write a program to create a database of 50 students that stores their personal details such as roll number, name and marks. Print all details of students entered by the user.

**Q4.** Answer ALL parts.

- (a) ✓ Define function in C. Differentiate between *call-by-value* and *call-by-reference* functions with example. 7

**OR**

Describe a recursive function with an example using C language.

- (b) ✓ Write C programs to sort following items 26, 10, 45, 56, 11, 67, 98, 3, 20 using Binary and insertion sort algorithms. 7

**Q5.** Answer ALL parts.

- (a) Write a program in C to reverse a given string of characters through pointers. 7

**OR**

- ✓ Define dynamic memory allocation. Explain different functions for dynamic memory allocation with suitable example.

- (b) ✓ Write syntax of I/O functions to handle a file in C. Write a program to append the given text at the end of an existed text using file handling in C. 7

**B.TECH.**  
**(SEM II) EVEN SEMESTER EXAMINATION 2023-24**  
**PROGRAMMING FOR PROBLEM SOLVING**

[TIME: 3 hrs.]

[Max. Marks: 70]

Note: Attempt All Questions. All Question carry equal marks.

- |  |            |  |  |       |
|--|------------|--|--|-------|
|  | <b>Q1.</b> | Answer ALL parts.  |  | Marks |
|  | (a)        | (i) Draw a block diagram of a digital computer and explain its components.                                     |  | 7     |
|  |            | (ii) Outline the basic structure of a program.   |  |       |
|  | (b)        | Why is memory system of a computer organised as a hierarchy? Discuss the basic elements of a memory hierarchy. |  | 7     |

OR

Describe Compiler, Interpreter, Assembler, Linker and Loader with help of neat diagram.

- |  |            |  |  |   |
|--|------------|--|--|---|
|  | <b>Q2.</b> | Answer ALL parts.  |  |   |
|  | (a)        | Explain the different types of operators in C language. When precedence of two operators in an expression is same, how does associativity help in identifying which operator to be evaluated first? Illustrate it with an example. |  | 7 |
|  | (b)        | State nesting of if- else statement. Give its flowchart. Also, write a C program to check whether a given character is in upper case, lower case or non-alphabetic character.  |  | 7 |

OR

A five-digit number is entered through a keyboard. Write a C program to obtain the reversed number and to determine whether the original and reversed numbers are equal or not.

- |  |            |   |  |   |
|--|------------|---|--|---|
|  | <b>Q3.</b> | Answer ALL parts.   |  |   |
|  | (a)        | Define an array. How the pointers in C language can handle the array? Explain it. Write a C program to print the following pattern: |  | 7 |

```
A
  A B
    A B C
      A B C D
        A B C D E
```

OR

A five digit positive integer is entered through a keyboard. Write a C program to calculate sum of digits of the 5-digit number:

- |  |     |   |  |   |
|--|-----|---|--|---|
|  |     | (i) Without using recursion   |  |   |
|  |     | (ii) Using recursion  |  |   |
|  | (b) | Differentiate between Entry controlled loop and Exit controlled loop with the help of an example. |  | 7 |

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- Q4. Answer ALL parts.
- (a) Write a C program to sort items using insertion sort. Show the trace of the program for the following input: 27,11,46,57,12,68,98,4,21 7
- (b) What is difference between sequential search and binary search technique? 7

OR

What do you mean by parameter passing? Discuss various types of parameter passing methods in C with example. Which is more efficient and why?

- Q5. Answer ALL parts.
- (a) Define the concept of pointer. Also, define the dynamic memory allocation and various functions for dynamic memory allocation with suitable example. 7
- (b) Define macro. How is it substituted? Also, explain how macro acts as a variable and macro acts as a function with the help of example. 7

OR

What are the various types of files that can be created in C? Also, give different modes in which these files can be used with proper syntax. Write a program in C to print the content of a given input file on output screen using file handling functions.