Reg. No.																

Question Paper Code	13340

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024 (JAN 2025)

First Semester

Computer Science and Engineering

(Common to All Branches)

24ESCS101 - PROBLEM SOLVING AND PROGRAMMING IN C

Regulations - 2024

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	What does the term 'primitive data types' refer to in C programming? (a) Types that are created by the user (b) Predefined types like int, float, and char (c) Variables that do not store values (d) Types used for memory allocation	1	K1	CO1
2.	Which of the following represents a valid C variable declaration? (a) int x (b) x int (c) int = 10 (d) int 10	1	K1	CO1
3.	Which of the following is NOT a phase in the development of a running C program? (a) Writing the program code (b) Compiling the code (c) Debugging the code (d) Drawing flowcharts	1	K2	CO1
4.	What is the output of the following code? int a = 5, b = 3; printf("%d", a % b) ; (a) 1 (b) 3 (c) 5 (d) 2	1	K3	CO2
5.	Which loop will execute at least once, even if the condition is false? (a) for (b) while (c) do-while (d) none of the above	1	K2	CO2
6.	What does the switch statement do in C programming? (a) Repeats a block of code until a condition is met (b) Transfers control to one of several code blocks based on a variable's value (c) Calculates the sum of a series of numbers (d) Exits the current function	1	K2	CO2
7.	What is the output of the following code? char str[] = "Hello"; printf("%d", strlen(str)); (a) 4 (b) 5 (c) 6 (d) 0	1	K3	CO3
8.	How do you declare a two-dimensional array in C? (a) int arr[10, 10]; (b) int arr[10][10]; (c) int[10][10] arr; (d) int arr[10];	1	K1	CO3
9.	Which function is used to concatenate two strings in C? (a) strcat() (b) strcpy() (c) strcmp() (d) strrev()	1	K1	CO3
10.	In C, how do you pass an argument by reference to a function? (a) By using * (dereferencing) (b) By using & (address operator) (c) By directly passing the variable (d) By copying the value	1	K2	CO4
11.	Which of the following is true about recursion in C? (a) Recursion reduces memory usage (b) Recursion occurs when a function calls itself (c) Recursive functions cannot use parameters (d) Recursive functions must always return values	1	K2	CO4

12. What is the result of the following code? *1 K3 CO4*

```
int a = 5, *b;
b = &a;
printf("%d", *b) ;
```

(a) 5 (b) 0 (c) Address of a (d) Compilation error

13. Which of the following can be used to declare a structure in C? *1 K2 CO5*
    (a) struct {int x; float y;} myStruct;
    (b) structure myStruct {int x; float y;}
    (c) struct myStruct {int x, float y;}
    (d) all of the above
14. How do you access a member of a structure in C? *1 K2 CO5*
    (a) Using & operator (b) Using * operator
    (c) Using dot (.) operator (d) Using comma operator
15. What is a self-referential structure? *1 K2 CO5*
    (a) A structure that refers to another structure
    (b) A structure that refers to itself
    (c) A structure with no members
    (d) A structure that stores data of same type
16. Which of the following is used to allocate memory dynamically in C? *1 K1 CO5*
    (a) malloc() (b) free() (c) realloc() (d) all of the above
17. What is the function used to open a file in C? *1 K1 CO6*
    (a) fopen() (b) open() (c) fileopen() (d) create()
18. Which of the following is used to read data from a file in C? *1 K1 CO6*
    (a) fwrite() (b) fscanf() (c) fgets() (d) fread()
19. What is the difference between sequential access and random-access files? *1 K2 CO6*
    (a) Sequential access allows reading files in any order
    (b) Random access files must be read from the beginning
    (c) Sequential access files are faster than random access files
    (d) Random access allows reading files in any order
20. How do you write data to a file in C? *1 K1 CO6*
    (a) write() (b) fwrite() (c) fprintf() (d) Both b and c

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21. List the various stages involved in the compilation process of a C program. *2 K1 CO1*
22. What is a keyword in C? Give examples of at least five C keywords. *2 K1 CO1*
23. Differentiate the ++ (increment) and -- (decrement) operators with examples. *2 K2 CO2*
24. Write a C program to find the largest of three numbers. *2 K3 CO2*
25. Write a C program to find the length of a given string. *2 K2 CO3*
26. Explain the process of performing matrix addition using two-dimensional arrays in C. *2 K2 CO3*
27. Suggest any two built-in string functions and math functions in C and their use case. *2 K1 CO4*
28. Write a program to swap two numbers using pointers in C. *2 K3 CO4*
29. Explain the use of the typedef keyword in C with an example. *2 K2 CO5*
30. Explain the difference between text files and binary files in C. *2 K2 CO6*

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31. a) State the need for designing the steps to solve a problem. Identify the flowchart symbols and state their purpose. Also, write a pseudocode to count the number of positive numbers, negative numbers and zeroes in a group of 'N' numbers provided by the user. *10 K2 CO1*

OR

b) Discuss in detail the different phases in developing and running a computer program in C with a simple example. Also, write an algorithm to print the first 'N' terms in the Fibonacci Series. *10 K2 CO1*

32. a) Explain the relational and logical operators in C with suitable examples. Also, write a C program to display the different stages of human being based on their age as follows: *10 K3 CO2*

Age	**Stage**
0 < age < 8	Childhood
7 < age < 18	Teenage
17 < age < 30	Youth
29 < age < 46	Senior
Above 45	Old

OR

b) Illustrate the role of increment, decrement operators, and bitwise operators with suitable examples. Also, write a C program to print all the prime numbers between a range of numbers. *10 K3 CO2*

33. a) Write a C program to analyze the marks obtained by students in a class as follows: The program should take as input the number of students 'N' (where N >= 5) and an array of N marks (ranging from 0 to 100). The program should calculate and display the Mean, Median, and Mode. If there are multiple modes, display all of them. *10 K3 CO3*

OR

b) Write a C program to help the librarian of a school organize the book titles stored in a library management system. The program should take as input 'N' (the number of book titles, where N >= 5) and N book titles as strings. Using the Selection Sort algorithm, the program must sort the book titles in alphabetical order (A-Z). Finally, display the sorted list of book titles. *10 K3 CO3*

34. a) Describe the role of functions in solving a complex problem? Illustrate its syntax. Also, write a C program to find the sum of digits of the given number and test whether the given number is palindrome number or not using function. *10 K3 CO4*

OR

b) Demonstrate the advantages of pointer arithmetic in C with suitable examples. Also, write a C program to calculate the square and cube of a given integer. The program should take an integer as input, pass it to a function using pointers, and return both the square and cube of the number to the main function using pointers. The main function should then display the results. *10 K3 CO4*

35. a) Write a C program to manage a Book Inventory System using a Singly Linked List, where each node stores details of a book: Book_ID, Title, Author, and Price. The program should provide the following operations: add a new book to the inventory, display all books, delete a book by its Book ID, and search for a book by its Title to display its details. The program should repeatedly display a menu to perform these operations until the user chooses to exit. *10 K3 CO5*

OR

b) Write a C program to manage the details of students in a class using Pointers and Structures. Define a structure named Student with the following fields: name, roll_no, and CGPA. The program should dynamically allocate memory for 'N' students (where N >= 3) and allow the user to input the details of each student. Use a pointer to access and display the student details along with identifying the student who has scored the highest CGPA. *10 K3 CO5*

36. a) Write a C program to manage employee records using a random-access file. Create a structure employee with members: emp_id, name, designation, salary, and experience. Have provision to add new employee details, update an existing employee's details by searching using emp_id, and delete a record. Additionally, implement a feature to display all employee details and search for an employee's details by emp_id. Use random access file operations to handle the records efficiently. *10 K3 CO6*

OR

b) Write a C program to design a structure student with the following members: roll_no, name, mark1, mark2, total, and average. Get 'N' number of student details from the user and store them in a sequential access file. After storing the data, the program should read the details from the file and display the details of a student whose roll_no is given by the user. Additionally, the program should display the details of the student with the highest total marks (the topper). *10 K3 CO6*