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Name :

MAR ATHANASIOUS COLLEGE OF ENGINEERING, KOTHAMANGALAM

(Govt. Aided Autonomous Institution)

First Semester B.Tech. Degree (SAY) Examination, February, 2026

Course Code: B24ES1T01A

Course Name: PROBLEM SOLVING AND PROGRAMMING TECHNIQUES

Common to EE, EC, CS, DS & AI branches

Max. Marks: 100

Duration:3 Hours

PART - A: 30 Marks (10 Qns x 3 Marks)**Answer all questions**

1. Write a simple C program that reads an integer from the user and prints whether it is odd or even. Use conditional operator.
2. Draw a flowchart to calculate the average fuel efficiency of a vehicle in kilometres per litre (KPL). The flowchart should prompt the user to enter the kilometres driven and the fuel consumed in litres for each trip. It should then calculate and display the vehicle's average KPL at the end of n trips.
3. Write a C program to print numbers at alternate position in an array.
4. Predict the output:

```
void main() { int matrix[][3] = { {1, 4}, {3, 6} }; int i,j; for(i=0;i<2;i++) { printf("\n"); for(j=0;j<3;j++) printf("%d", matrix[i][j]); } }
```
5. Find the error, if any, in the following code segment

```
char s1[5],s2[5],  
gets(s1,s2);
```
6. What will be the output of the following statement?

```
printf("%d",strcmp("push","pull"));
```
7. Create a union **Data** with an integer, float, and character array. Demonstrate memory overlap by assigning values to each and printing them.
8. Explain the effects of the following statements:
(a) `int a, *b = &a;`
(b) `int p, *p;`
(c) `char *s;`

9. While opening the file in “r” mode, the file being opened may not be present on the disk at all. Similarly, while opening the file for writing, fopen() may fail due to a number of reasons, like, disk space may be insufficient to open a new file, or the disk may be write protected or the disk is damaged and so on. Explain how the situation is handled in c programming.

10. Identify the error in the following code

```
#include<stio.h>
auto int x=8;
int main()

{
printf("x value is %d",x);
return 0;
}
```

PART - B: 70 Marks (5 Qns x 14 Marks)

Answer any Five full question from each module.

Module 1

11. a. Write a C program that reads the employee's ID, name, status ('F' for full-time and 'P' for part-time) and basic pay. DA and HRA for full-time employees are 75% and 10% of basic pay, respectively. Part-time employees have basic pay only. Print the total salary of the employee. (7 marks)
- b. Explain the difference between primary and derived data types in C. Provide examples for each category. Why is it important to choose the correct data type for variables in a program? (7 marks)

OR

12. a. Write a C program to perform bitwise shifting on a given integer and display the results of left shift (<<) and right shift (>>). Demonstrate with an input value of 20. (7 Marks)
- b. Explain the difference between arithmetic operators and bitwise operators in C. Provide an example where both types of operators are used in a single program. (7 Marks)

Module 2

13. a. Write a C program to find the factorial of a number using do-while ,where the number n is entered by user. (7 marks)
- b. Write a C program to check whether given number is even or odd using switch statement. (7 marks)

OR

14. a. Write a C Program to check if a given number is a strong number or not.
A strong number is a number in which the sum of the factorial of the digits is equal to the number

itself. Eg:- $145 = 1! + 4! + 5! = 1 + 24 + 120 = 145$

(10 marks)

b. Write a C program to check whether a given number is a prime number or not.

(4 marks)

Module 3

15. a. Write a program in C to check Armstrong and Perfect numbers using the function. (7 marks)

b.. Write a C program to find diameter, circumference and area of circle using functions. (7 marks)

OR

16. a Write a C program to display the Fibonacci series using a recursive function. (7 marks)

b Write a C program to find the sum and average of an array of integers using user-defined functions. (7 marks)

Module 4

17.

(a) Write a function `revAr` that takes a pointer to an integer array and its length as parameters and reverses the elements of the array in place. Demonstrate the function in the main function by reversing a sample array. (7 marks)

(b) Write a function `comAr` that takes pointers to two integer arrays and their lengths as parameters and compares them to see if they are identical. The function should return 1 if the arrays are identical. Demonstrate the function in the main function by comparing two sample arrays. (7 marks)

OR

18. (a) Define a structure `Employee` with fields for name, ID and salary. Write functions to set the details and display the details of the structure. Use a pointer to a function to call the `display` function. (7 marks)

(b) Write a function declaration for `checkHumidityAlert` that accepts a pointer to an array of integers representing recent humidity levels over a few hours. The function should analyze the data and return a character that represents an alert level: 'N' for Normal, 'W' for Warning, or 'C' for Critical. (7 marks)

Module 5

19. Two persons want to access a file "sample.txt". First person want to read the data from the file. The second person want to read and write the data's from and to the file simultaneously. Can you help them to do so by writing the corresponding programming codes?

OR

20. Write a C program to read data from a text file and display it on the console. Explain each step in the program
