Registration No.: | | | | | | | | | | |

Total Number of Pages: 02 **Course: IDD (B.Tech and M.Tech)**
Sub_Code: RPL2B001

2nd Semester Back Examination: 2024-25
SUBJECT: Programming For Problem Solving Using C
BRANCH(S): AEIE, AUTO, BIOTECH, CIVIL, CSE, CSEAI, CSEAIML, CSEDS, CSIT, CST, ECE, EEE, EIE, ELECTRICAL, ELECTRICAL & C.E, ETC, IT, MECH, METTA, MINING, MME, PLASTIC
Time: 3 Hours
Max Marks: 100
Q.Code: S324

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What is an algorithm? How is it represented?
b) Differentiate between syntax errors and logical errors in C programming.
c) Find the output:

```
#include <stdio.h>
int main() {
   int x = 5;
   printf("%d %d %d", x++, ++x, x);
   return 0;
}
```

d) Explain the difference between an interpreted and a compiled language. Why is C a compiled language?
e) Explain the difference between call by value and call by reference.
f) What is dynamic memory allocation? Name two functions used for it in C.
g) Define a self-referential structure with an example.
h) Which ASCII and binary file formats are used in file handling?
i) Compare structures and unions in C with examples.
j) Define pointers. How do they differ from arrays?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Write a program to count the occurrences of each character in a given string.
b) Write a C program to check whether a number is prime or not.
c) Describe recursion. Write a recursive C program to find the **GCD of two numbers**.
d) Implement a function to reverse a string without using built-in functions.
e) Write a program in C to implement the **binary search algorithm** for a sorted array of integers.
f) What is a dangling pointer in C? Write 2 pros and 2 cons of a dangling pointer.
g) Explain function prototypes, parameter passing, and return types with examples.
h) Write a program in C to take the message as user input and print a ciphertext for the message below by using the given encryption key.
Message: Your syllabus provides a strong foundation in C programming, covering key concepts from basic algorithms to advanced file handling
Encryption Key: Shift all the alphabet by 3 positions.

i) Write a menu-driven program to simulate a banking system allowing users to **deposit**, **withdraw**, and **check their balance**.

j) Write a program that accepts a person's age and checks their eligibility for a driving license. The eligibility rules are:
Age < 18 → Not eligible, Age = 18 → Eligible for learner's permit, Age > 18 → Eligible for full license

k) Take a number as input from the user and display its multiplication table (up to 10)

l) Write an algorithm to calculate the **total cost of fruits** bought from a market. The algorithm should: 1) Ask the user to enter the price per kg of apples, 2) Ask for the number of kgs bought, 3) Multiply the two to get the total cost, 4) Display the total amount to be paid.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four) **(16 x 2)**

Q3 **a)** Write a C program to simulate a loan approval system that takes **monthly income (MI), credit score (CS)**, and **requested loan amount (RLA)** as input from the user and determines **loan eligibility.** **(8)**
Eligibility Criteria: 1) MI > = Rs. 80,000, CS > = 750, and RLA > = 10 times of MI: High Eligibility to get loan, 2) MI > = Rs. 50,000, CS > = 650, and RLA > = 5 times of MI: Moderate Eligibility to get loan, 3) MI < Rs. 50,000, CS < 650: Not Eligible to get loan.

b) You are organizing a running competition. Write a C program to input the completion times (in minutes) of 10 participants and display the fastest and slowest times using arrays. **(8)**

Q4 **a)** A restaurant tracks the number of customers visiting each day over a week. Write a program to input daily customer counts for 7 days and calculate the total and average number of customers. **(8)**

b) Write a program in C that calculates the electricity bill of a household. Use a user-defined function that takes the number of consumed units and returns the total bill amount based on the tariff rates: First 100 units: ₹5/unit, Next 100 units: ₹7/unit, Above 200 units: ₹10/unit **(8)**

Q5 **a)** Design a program to check if a given city name entered by the user starts with the letter 'S'. Use string functions and conditional statements. **(8)**

b) Simulate an ATM PIN entry system. Allow a maximum of 3 attempts using a loop. If the PIN is correct, print "Access granted"; otherwise, print "Card blocked". **(8)**
NOTE: Use compile-time initialization to store the correct pin and match the pin by using run-time initialization.

Q6 **a)** Make a flowchart for a **laptop charging reminder system**. The system should: **(8)**

- If the battery is **below 20 %**, display a message: “Battery Low – Please Charge.”
- If the battery is **between 20 % and 80 %**, display: “Battery Level Normal.”
- If the battery is **above 80%**, display: “Battery Sufficient – Unplug Charger if Connected.”

b) Write a program in C using a union to store vehicle information. Each vehicle can either be a **car** (with a number of seats) or a **truck** (with load capacity in tons). Input the type of vehicle and its specific data, then display the details accordingly. **(8)**