**Registration No.:**

**1st Semester Regular/Back Examination: 2024-25**
**SUBJECT: PROGRAMMING IN C AND DATA STRUCTURE**
**BRANCH(S): PLASTIC,MINING, METTA,MECH, ME,MANUTECH,ELECTRICAL, ELECTRICAL &C.E., EEE,ETC,ELECTRONICS & C.E., ECE,CST,CSEDS,CSEAIML,CSEAI,CSE,AUTO,AEIE,AERO, AE, BIOMED, BIOTECH,CHEM,CIVIL, CE**
**Time: 3 Hours**
**Max Marks: 100**
**Q.Code: R511**
**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 a global variable and a local variable? Give an example.
  **b)**  Define a symbolic constant. Give an example. Why is it used?
  **c)**  What are *getchar ()* and *putchar ()* functions and why they are used?
  **d)**  List the different types of errors that occur during the execution of a C program.
  **e)**  Differentiate between postfix and prefix operators with an example.
  **f)**  Distinguish between compiler and interpreter.
  **g)**  Differentiate between *while* and *do-while* loops.
  **h)**  Distinguish between homogeneous and heterogeneous data structures.
  **i)**  Explain pointer to function with an example.
  **j)**  Difference between a binary tree and a binary search tree with an example.

**Part-II**

**Q2**   **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**       (6 x 8)
  **a)**  Difference between Linear Search and Binary Search. Write the pseudocode to implement binary search. Search the value "14" from the following sequence of numbers:
         2, 5, 10, 14, 15, 30, 38
  **b)**  What is dynamic memory allocation? Write and explain the different dynamic memory allocation functions in C.
  **c)**  Write a program to find the area of a rectangle using call-by-reference.
  **d)**  Write a program to find whether a number is PALINDROME or not.
  **e)**  Write a C function "*isprime(num)"* that accepts an integer argument and returns 1 if the argument is prime; a 0, otherwise. Write a C program that invokes this function to generate the prime numbers between a given ranges.

**f)** Explain what is an algorithm and what is a flow-chart? How are they used as a problem-solving tool? Give an example to justify your answer.

**g)** Write a C program to copy the contents from one string to another without using the string functions.

**h)** Write a program to read 20 unsorted numbers to an array and pass the address of this array to a function to sort the numbers in ascending order using bubble sort technique.

**i)** Explain array of pointers and pointer to array with an example from each.

**j)** Can a function return multiple values? Justify with an example.

**k)** Differentiate between "break" and "continue" statements with an example.

**l)** Construct the binary tree from the given sequence:
Pre-order: A B D E C F
In-Order: D B E A F C


### Part-III
### Only Long Answer Type Questions (Answer Any Two out of Four)

**Q3 a)** Explain about array of structures and structure within a structure with an example. **(8+8)**

**b)** Write a C program to maintain a record of 10 players of Indian Cricket team. Print the scores of each player in 5 matches given the name of each player.

**Q4 a)** Explain the two-way selection (*if, if-else, nested if-else*) in C language. **(8+8)**

**b)** Write a C program to read a year as input and find whether it is a leap year or not

**Q5 a)** Explain what is a recursive function along with its properties. **(10+6)**

**b)** Write a C program to print the Fibonacci sequence of 10 numbers using recursion.

**Q6 a)** Differentiate between an array and a linked-list. **(10+6)**

**b)** Write an algorithm to create a single linked-list of 5 nodes. Insert the elements and display them.