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Roll No:

(To be filled in by the candidate)

## PSG COLLEGE OF TECHNOLOGY, COIMBATORE 641 004

## SEMESTER EXAMINATIONS, JANUARY 2023

MCA Semester: 1

## 20MX12 STRUCTURED PROGRAMMING CONCEPTS

Time : 3 Hours Maximum Marks : 100

	INSTRUCTIONS:	-0	20	~G *
	Answer ALL questions. Each question carries 25 Marks.			
١	<ol><li>Subdivision (a) carries :</li></ol>	3 marks each, subdiv	ision (b) carries	0 marks each and
	subdivision (c) carries 12		N. SON	160
	3. Course Outcome : Qn.1 C	CO1. Qn.2 CO2.	Qn.3 CO3.	Qn.4 CO4.
	Table Circle	.01.	Qa.5 CO3.	Q11.4 CO4.

- a) Compare and Contrast Bottom-Up and Top-Down approaches for Structured Programming.
  - Explain the essences of 'Structured Programming Concepts' and its benefits in applications development.
  - c) i) Discuss the various criteria for classification of Programming Languages. Based on these criteria fit the position of Programming Language C in the classification chart. Mention when to use and when not use C for software development.

    [6]
    - Discuss the various properties of good programming language in the perspective of programmer and language developer. Enumerate reasons for the popularity of a programming language. Give simple illustrations in C for the above said points [6]
- a) Distinguish Iteration from Recursion with an example.
  - b) Compare and contrast the following programming language constructs:
    - i. Expressions and Statements
      ii. Iterative structure Statements and its sequence control [6]
  - c) i) An element of a 2D array is a saddle point if it is the "maximum" in its column and the "minimum" in its row. Assume all array elements are having distinct values. For example the element with index (1, 1) is a saddle point for the matrix:

1 2 3 7 5 6 7 4 9

Complete the function below to check if the element (r,c) is a saddle point for the matrix M of size r(x)n.

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```
int isSaddlePt(int M[
  i, j flag =
int
for(i
   if (
for(j = 0;
      j < n;j++√)
return flag
```

Complete the program fragment below to print all the saddle points of the matrix M having size n x n. Assume that value of n, and elements of the matrix M, are already available.

```
int M[100][100],
for (i = 0; i < n; i++) {
      for (j = 0; j < n; j++)
                                          -){_G
                  printf(
                          "M[*d][*d] is a saddle point.
                                            there can be only one */
                                            saddle point in a row */
      if ( flag == 1
                              / * there can be only one *
                               * saddle point in a column *
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```

ii) Write a C program that accepts an array A of n integers and rearrange the elements of A such that it satisfy the following inequalities A[0] < A[1] < . . . . m in the valid range. Let us call such an array a hill-valued array. The sequence A[0],A[1], ..., A[m-1],A[m] is called the according to the sequence.  $A[m-1] < A[m] > A[m+1] > A[m+2] > \cdots > A[n-1]$  for some (unknown) index A[0],A[1], ..., A[m-1],A[m] is called the ascending part of the hill, and the remaining part A[m],A[m+1], ...,A[n-1] is called the descending part of the hill. The element A[m] is the peak of the hill and is the largest element in the array

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3. a) In the following C code snippet, fill in the blanks so that the program will print the values as mentioned in the comment section.

```
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#include<stdio.h>
int main()
    int a[] = {10,5,21,51,3,2,19}, *p;
            (1)
    printf("%d\n", *p); // It will print 10
  printf("%d\n", "p); // What will be printed line? (2)
    printf("%d\n", *p); // It will print 3
    p = (4)
   printf("%d\n", *p); \/\lt will print 19 -\/
    p=p-*(a+1);_<
    printf("%d\n", "p); // What will be printed above line? (5)
                                                                           13PSG TECH
```

- b) (i) In this C declaration "long \*(\*(\*(\*z)(void))[7](void);", What is z? Give syntax for the use of 'z'.
- ii) The following C function is used to compute the product of two matrices, with each matrix represented as a 2-d array. The function takes as parameters a 2-d array A with n r A rows and n c A columns and a 2 d array B with n r B rows and n\_c\_B columns. The function returns a pointer to the first element of the product describe the output generated by the following program matrix C. Fill in the missing lines using pointer notations. Find the output and [7]

```
int ** mult(int **a, int n ra,int n c a,int **b,int n r b, int n c b)
int ----- ; // declare suitable variable for returning results
int sum,i,j,k;
                                       ; // dynamic memory allocation
for(i=0;i< n r a;i++)
                       -----; //dynamic memory allocation
     for(j=0;j< n_c b;j++)
       c[i][j]=0;
       for(k=0;k< -----;k++)
                   (*(*(C+i)+j)= -----
retum -----
```

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c) i) Discuss the following aspects of structured programming with illustrations from C and compare them

- a. Call by Value and Call by Reference
- Storage Classes
- Arrays and Structures
- (ECH[3] d. Binary Files and Text Files.

- a. Give the uses of Name Spaces, 'volatile' and 'const' keywords
  b. Trace the following program and finding

```
# include <stdio.h>
int funct1 (int);
int funct2(int);
int main() {
            int a=0,count;
             static int b=1;
                    for ( count = 1; count < = 5; ++count)
                 b+=funct1(a++) + funct2(a++);
               printf("%d",b++);
           return 0;
int funct1( int a)
        b= funct2(a++);
       return b++:
int funct2(int a)
       static int b= 1;
        b+=1:
        return(b++ + a++);
```

- How to decide when to use and when not use Scripting and System Programming language for application development?
  - Compare and contrast the features of system programming languages and scripting languages in detail.
  - i) Explain the features offered by Static library, Dynamic library and low level programming in C for application development.
    - Discuss the role of Markup languages in Web applications.