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Roll No.

TCS-201

B. TECH. (SECOND SEMESTER)

END SEMESTER

EXAMINATION, June, 2023

PROGRAMMING FOR PROBLEM SOLVING

Time :Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among
(a), (b) and (c) in each main question.

(iii) Total marks in each main question are
twenty.

(iv) Each sub-question carries 10 marks.

1. (a) Illustrate with a fragment of C code and explain the compile time and runtime initialization of 1-D and 2-D character arrays. (CO1, CO2)

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- (b) Draw a flowchart and write a C program that reads a sentence from the standard input device separated by single space between the words. Design a UDF 'SubStr' that returns a sub-string through its argument to the calling program by taking the starting position and ending position as arguments to the function. Display the sub-string in the calling program. (CO1, CO2)

- (c) Write an algorithm and implement a C program to read an entire string in lowercase or uppercase from the keyboard then replace the character at the middle of the string by the character 'X'. If the string read is of even length, then ignore it. Display the modified string to the screen. Implement without using any in-built function. For Ex : (CO1, CO2)

Sample Input: PROGRAMMING

Sample Output: PROGRXMMING

Sample Input: merchandise

Sample Output: merchXndise

2. (a) Assume a pointer pointing to a floating-point number. Elaborate the meaning of pointing to an address and dereferencing of its value with a snippet of C code. Implement a C program to read N numbers from the keyboard into an array. Using a pointer display their sum and average to the screen. (CO3, CO4)
- (b) Assume a character array `STR[] = {"CALENDAR YEAR2023"}`. Develop a C program using a pointer to segregate the string and the number into two different variables without using any built-in function. Display the string and the number to the output. Draw a flowchart for the same. (CO3, CO4)
- (c) Design a C program that reads the details of N items such as ItemCode, Name, Qty and Price into a structure. Display the Total Amount in Rupees worth of inventory of N items to the console : (CO3, CO4)

Sample Input: N = 3

101 ITEM1 100 55.00

102 ITEM2 50 10.50

103 ITEM3 30 20.10

Total amount worth of 3 Items in Rs. is 6628

3. (a) How is structure different from union in C ? Illustrate with an example. Implement a C program to read the details of a device such as Device ID (assume it as an integer type), Device Name (assume character string of not more than 50 characters) and Device Number (assume an integer type) as the union members. Display the amount of memory allocated in bytes by the union to the console. Justify your answer. (CO4, CO5)
- (b) Open a file "Data.txt" present in the current default path with file pointer set at 50 bytes offset from the beginning of the file. Read the next 100 characters from the position of the current file pointer and display the same to the standard output device by converting all the alphabets into uppercase. (CO4, CO5)

- (c) Explain in brief the meaning of the following functions with a fragment of C code : (CO4, CO5)

(i) fprintf

(ii) fseek

(iii) fgetc

(iv) rewind

The code is free of syntax errors. Ignore if any.

4. (a) Predict the output of C and Python code :

(CO1, CO3, CO5, CO6)

- (i) #include<stdio.h>

```
int main()
```

```
{
```

```
    char str[ ] = "Mindful";
```

```
    printf("%c", str[3] — 3 );
```

```
    return 0;
```

```
}
```

- (ii) #include <stdio.h>

```
int main()
```

```
{
```

```
    int x[ ]={10,15,20,25,30};
```

```
    int i,*p=x;
```

```
    for(i=0;i<4;i++) {
```

```
*p=*p+5
p=p+1;
p=20j
printf("%d ",x[i];
}
return 0;
}
```

(iii) #include <stdio.h>

```
int main()
{
char str{50];
FILE *fp=fopen("para.txt", "w+");
fprintf(fp, "Stitch in time saves nine");
fseek(fp, - 10L, 2);
fscanf(fp, "%5s", str);
printf("%s", str);
fclose(fp);
return 0;
}
```

(iv) Code in Python

```
words = "Tic Tac Toe"
print(words[: -1])
print(words[-3 :])
```

```
(v) dt= { }  
    collection = ["A", "BB", "CCC",  
                  "DDDD"]  
  
    for w in collection[ : : - 1]:  
        if w not in dt:  
            dt [w] = len(w)*2  
            print(dt)
```

- (b) Enumerate the important features of Python programming language. Demonstrate with a Python code the usage of the exponential operator, integer division and short-circuit operator.

(CO1, CO3, CO5, CO6)

- (c) Using snippet of Python code demonstrate the use of the following functions : (CO1, CO3, CO5, CO6)

- (i) range
- (ii) extend
- (iii) sort
- (iv) remove

5. (a) Write a Python script to read a string from the user and display it by capitalizing the alternate letter present in it to the console :
(CO5, CO6)

Sample Input :

“mountaineering”

Sample Output:

“MoUnTaInEeRiNg”

- (b) **“List is mutable while tuple is immutable.”** Justify the statement with similarities and differences between a list and a tuple with a Python code. Write a Python script to append N city names and their population to a list and display the same.
(CO5, CO6)
- (c) Illustrate the concept of file handling in Python. Assume a file **“sample.txt”** present in the current drive. Write a Python code to display the count of lines present in it to the output screen. Assume each line is terminated by a newline character.
(CO5, CO6)