PROGRAMMING FOR PROBLEM SOLVING
(CSEN 1001)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

    (i)   Which of the following is an invalid declaration of variable in C?
            (a) int 2AA   (b) int A2A   (c) int AA2   (d) int _AA.

    (ii)   What will be the output of the following code segment in C?
            #include <stdio.h>
            int main()
            {
                int x = printf("%s", "KOLKATA");
                printf("%d", x);
                return 0;
            }
            (a) syntax error   (b) 7   (c) runtime error   (d) 0 (zero)

    (iii)   In which part of the C program compilation process, macros are dealt with?
            (a) Assembly   (b) Linking   (c) Pre-processing   (d) Loading.

    (iv)   Let's suppose that an array A is initialized in C as follows:
                char A[10] = "HIT2019";
             What is the content of A[7]?
            (a) '0'   (b) '\0'   (c) '9'   (d) Cannot be determined.

    (v) $(1111111111)_2$ is equal to
            (a) $2^{11} - 1$ (b) $2^{11} + 1$ (c) $2^{10} - 1$ (d) $2^{10} + 1$

    (vi)   The expression 4 + 6 / 3 * 2 – 2 + 7 % 3 evaluates to
            (a) 7   (b) 6   (c) 4   (d) 3

    (vii)   How many times is 'Hello' printed in the following C program?
            int main()
            {
                int x;

```
for(x=-1;x<=10;x++)
{
    if(x<5)
        continue;
    else
        break;
    printf("Hello\n");
}
return 0;
}
```
(a) Infinite times   (b) 11 times   (c) 0 (zero) time   (d) 10 times.

(viii) When you pass an array as an argument to a function in C, what actually gets passed?
   (a) Base address of the array
   (b) First element of the array
   (c) All elements of the array
   (d) Addresses of both the first and last element of the array.

(ix) Which of the following is equivalent to $y = y * 2$, (data type of y is int)?
   (a) $y = y << 1$ (b) $y = y << 2$ (c) $y = y >> 1$ (d) $y = y >> 2$

(x) Which of the following operations can be performed on the file 'TESTFILE.TXT' using the following code segment written in C?
```
FILE * fp;
fp=fopen("TESTFILE.TXT","r+");
```
   (a) Reading   (b) Appending
   (c) Writing   (d) Both reading and writing

Group – B

2. (a) Convert $(17.625)_{10}$ to IEEE 754 single precision (32 bits) floating point representation.

   (b) Calculate $(-36)_{10}+(-45)_{10}$ using binary 2's Complement Sign-Magnitude form.

   (c) Draw a flowchart to print the factorial of a number.

5 + 3 + 4 = 12

3. (a) Convert $(91)_{10}$ and $(39)_{10}$ into binary number system
Now, perform $(91)_{10} – (39)_{10}$ using 2's complement system.

   (b) Convert $(29.125)_{10}$ into Binary and Octal number system.

   (c) Draw a flowchart to print the sum of digits of a number entered by the user.
(2 + 2) + 4 + 4 = 12

Group – C

4. (a) What is type casting? Explain implicit and explicit type casting with suitable example.

(b) Write a C program to determine whether a number, entered by the user is palindrome or not.
Your program will also find the number of digits present in the input number.

(c) Why in C programming the use of *goto* statement is generally discouraged?

(2 + 2) + 6 + 2 = 12

5. (a) Write a C program to print the following pattern where the number of rows in the pattern should be given by the user

```
* * * *
 * * *
  * *
   *
```

(b) Write the equivalent 'do......while' loop statement in C for the following 'for' loop:
for (k=5; k<87; ++k)
printf("%d\n", k*k);

(c) Write a program in C to find the sum of the following series without calculating factorial for each term separately —

$$1+\frac{1}{1!}+\frac{1}{3!}+\frac{1}{5!}+..... \text{ upto } n \text{ terms}$$

where, n is an user input.

5 + 2 + 5 = 12

Group – D

6. (a) Consider the following C statement:
```
float result = 36.0/SQUARE(2+1);
```
For each of the three versions of the macro SQUARE() below, what will be the corresponding value of 'result' ?
(i) #define SQUARE(x) (x*x)
(ii) #define SQUARE(x) (x)*(x)
(iii) #define SQUARE(x) ((x)*(x))

(b) Write a function in C that accepts a string as a parameter and returns the length of the string. Write a driver program to test the function. Do not use any string library function.

(c) What are *extern* and *static* variables? Explain their utility with suitable examples.

3 + 5 + 4 = 12

7. (a) Write a C function to find the maximum element of an array. The function takes the array and the array size as two parameters and returns the maximum value of the array. Write main( ) to test the function.

(b) Write a program in C to first declare a 2 - dimensional array dynamically. After that populate the array with the values given by the user and then print the array in matrix format.

(c)   What are differences between calloc() and malloc() functions?

6 + 4 + 2 = 12

Group – E

8.   (a)   How can you check whether a file exists or not by using the fopen() function?

     (b)   Explain the utility of *feof( )* function.

     (c)   Write a program in C to define a structure named **student** with members – name (string), roll (integer) and CGPA (float). It should be able to take n many students' details as input and print the details of the student who obtained highest CGPA.

2 + 2 + 8 = 12

9.   (a)   Write a C program to copy the contents of a source file to a destination file, assuming the source is a text file.

     (b)   Write a C program to display the frequency of characters in a given text file.

6 + 6 = 12

Department & Section	Submission Link
ME A	https://classroom.google.com/c/MjMxMTYzMDQ2MzMy/a/Mjg4NDMxMDcxOTU0/details
ME B	https://classroom.google.com/c/MjM1MjkyODA0OTY5/a/Mjg4NDI5NjY0OTEx/details
BT	https://classroom.google.com/w/MjMwOTgwOTk5NTU2/tc/Mjc4ODQ5MjU0OTgx
EE	https://classroom.google.com/w/MjMzNTAzNTAzNjcx/tc/Mjg4NDI4NDc1MzM3
CE A	https://classroom.google.com/c/MjMwNjI4MDExNjUx/a/Mjk0NDQzNTYzNjA0/details
CE B	https://classroom.google.com/c/MjMyMTczMzc3MzU4/a/Mjk0NDI0OTTI5MDkw/details
CHE	https://classroom.google.com/c/MjE1NzU4OTU1MTA3/a/Mjk0NDMyODc4NzU0/details
BACKLOG	https://classroom.google.com/c/MjkzMDU0NzAzMzI2/a/MjkzMDU0NzAzMzU4/details