INTRODUCTION TO PROGRAMMING
(MCAP 1101)

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

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one 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) Is the below declaration legal?

```
int* ((*x)())[2];
```

(a) true (b) false
(c) Undefined behaviour (d) Depends on the standard

(ii) The output of the following code snippet would be:

```
int z, x=5,y=-10,a=4,b=2;
z = x++ - --y * b / a;
printf( "%d ",z);
```

(a) 10 (b) 11
(c) 12 (d) 9

(iii) Can you combine the following two statements into one?

```
char *p;
p = (char*) malloc(100);
```

(a) char p = (char*)malloc(100) (b) char p = *(char *) malloc(100)
(c) char *p = (char*)malloc(100) (d) None of these

(iv) Which of the following is the correct usage of conditional operators used in C?
(a) a>b ? c=30 : c=40; (b) a>b ? c=30;
(c) z = a>b ? a>c? a:c:b>c? b:c (d) return (a>b)?(a:b)

(v) Find the output of the code snippet given below

```
int x;
int buf[]= {1,2,3,4,5,6,7,8,9};
x = (buf+1)[5];
printf("%d", x);
```

(a) 5 (b) 6
(c) 7 (d) 8.

(vi) 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

(vii) Find the output of the following grogram

```
#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).

(viii) Which one of the following declarations is invalid?
(a) int 2A (b) int A2A
(c) int A2 (d) int AA2

(ix) Arguments that take input by user before running a program are called?
(a) main function arguments (b) main arguments
(c) command-line arguments (d) parameterized arguments

(x) Inspect the following code snippet and find out the output of the loop?

```
int x= 2,y=6,z=6;
while(z > 0){
    z=(++y + z)%x;
    printf("%d", z);
}
```

(a) 101 (b) 11
(c) 110 (d) 1.

Group – B

2. (a) Justify, "the range of signed char (1 bytes) is -128 to +127".

(b) What do you mean by "top-down'' programming approach? Define its advantages? How is it carried out?

(c) A positive integer n > 1 is called a mersenne prime if n is a prime number and n = 2^k-1 for some positive integer k. For example, 3, 7 and 31 are all Mersenne primes.
Write down a program in C to find out the smallest mersenne prime > p where p >1 is taken from keyboard. [Thus, if p = 25, your program should output 31.]

3 + 3 + 6 = 12

3. (a) float x=5.2;
prinf("%f", x);
What is the exact value of x and Explain the problem in this program.

(b) Write a program to take number of rows to be printed as input and display the following output. If number of rows to be printed is 5 then the output will be

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

(c) Compare and contrast between *entry control* loop and *exit control* loop.

3 + 6 + 3 = 12

Group – C

4. (a) Suppose a break statement is including within the innermost of several nested iterative statements. What happens when the break statement will execute?

(b) The *sin(x)* can be calculated approximately by summing the terms of the infinite series as follows

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} \ldots$$

Where x is expressed in radians ($Note: \pi\, redians = 180^0$)
Write a program in C that will read a value x and then calculate *sin(x)* in the following ways
(i) Sum up the first n terms, where n taken from keyboard.
(ii) Continue summing up the successive terms in the series until the value of the next term becomes smaller (in magnitude) than 10^{-5}.

2 + (5 + 5) = 12

5. (a) What is an array? What is a multidimensional array?

(b) Consider the following recursive function. Assume that both n, k are positive.

```
int  S( int n, int k ){
        if (k > n) return 0;
        if ( (k == 1) || (k == n) ) return 1;
        return S(n-1,k-1) + k * S(n-1,k);
}
```

What value will returned by S (5, 3)? Show step by step execution of the function.

(c) Implement the following recursive function with the prototype given below:
int exponent(double x, int y);
This function will evaluate and return x^y if there is no overflow (i.e. value out of range for integer). Otherwise in case of overflow the function will return 0.

2 + 4 + 6 =12

Group – D

6. (a) Explain how the pointer argument is declared within the function definition.

   (b) Can the address operator act upon an arithmetic expression (like * (u + v))? Explain the reasons for your answer.

   (c) Write a program in C to sort a list of *name*, using dynamic memory allocation, where *n* will be taken from command line as an argument.

3 + 3 + 6 = 12

7. (a) Implement using a program in C, the library functions strncmp( ) and strncpy( ).

   (b) How can the indirection operator (*) be used to access multidimensional array elements?

   (c) Explain the meaning of *void pointer* and *null pointer*.

(3 + 3) + 4 + 2 = 12

Group – E

8. (a) Can the period operator be used with an array of structures? Explain.

   (b) What happens when a pointer to structure is incremented? Explain.

   (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.

   (d) What is the precedence of the → operator? Explain its associativity?

2 + 2 + 6 + 2 = 12

9. (a) Write a program in C to copy the contents of one file to another file?

   (b) How do you access the structure member through a structure pointer and structure variable? Explain with an example.

6 + 6 = 12

Department & Section	Submission Link
MCA	https://classroom.google.com/u/1/w/Mjg4NDM4MzMwNTE0/tc/Mjk0NDM2OTI2NjA4