

**B.TECH/ AEIE/ CSE / ECE/ IT/2<sup>ND</sup> SEM/ CSEN 1001/2019**  
**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 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) What is the default return type of malloc()?  
 (a) int (b) (int \*) (c) (void\*) (d) void.
- (ii) What will be the O/P of the following code:  

```
int main(void)
{
    int a, x, count = 0;
    for(a = 1; a >= 1 ; a = a << 2) {
        count++;
    }
    printf("%d\n",count);
    return 0;
}
```

 (a) 16 (b) 15 (c) 1 (d) cannot be said, infinite loop.
- (iii) int i = -2;  
 what will be the bit pattern when variable i is assigned with the value:  
 (a) 11111111111111111111111111111110  
 (b) 111111111111111111111111111111101  
 (c) 111111111111111111111111111111111  
 (d) 111111111111111111111111111111100
- (iv) What is the octal representation of (AB34.F9)<sub>16</sub>  
 (a) (125464.762)<sub>8</sub> (b) (135464.763)<sub>8</sub>  
 (c) (124464.762)<sub>8</sub> (d) (126454.762)<sub>8</sub>
- (v) What is the output of the following code?  

```
#include <stdio.h>
int main()
{
    static int i=5;
    if (--i){
        printf("%d ",i);
        main();
    }
}
```

 (a) 4 3 2 1 (b) 1 2 3 4 (c) 4 4 4 4 (d) 0 0 0 0.

- (vi) What is the output/error of the following code:  

```
#include <stdio.h>
#define square(x) x*x
int main()
{
    int x;
    x = 36/square(6);
    printf("%d", x);
    return 0; }

```

 (a) 6 (b) 1 (c) 36 (d) compilation error.
- (vii) When fopen() is not able to open a file, it returns  
 (a) EOF (b) NULL (c) Runtime Error (d) Compiler Dependent
- (viii) Given an if statement with three compounded conditions, which of the below would guarantee that a statement inside the if block is never reached when at least one of the three conditions is FALSE.  
 (a) if(condition1 && condition2 && condition3)  
 (b) if(condition1 || condition2 && condition3)  
 (c) if(condition1 && condition2 || condition3)  
 (d) if(condition1 || condition2 || condition3).
- (ix) What will be the output of the program?  

```
char *p;
p = "Hello";
printf("%c", *&p);

```

 (a) segmentation fault (b) H (c) Hello (d) e.
- (x) What will be the value of X?  
 If (X1)<sub>6</sub> = (127)<sub>x</sub>  
 (a) 3 (b) 2 (c) 3 and 2 both (d) none of these.

**Group – B**

2. (a) Show the memory content of (-1235.625)<sub>10</sub> using IEEE 754 floating point 32 bit representation. Show each step of calculation the memory content.
- (b) Convert from one number system to the other:  
 (i) (24562.76)<sub>8</sub> = (?)<sub>16</sub> (ii) (87.625)<sub>10</sub> = (?)<sub>2</sub>
- (c) What is the advantage of using 2's complement representation over 1's complement representation of a number?  
**6 + (2 × 2) + 2 = 12**
3. (a) (i) Explain memory hierarchy.  
 (ii) Perform the operation of (64)<sub>10</sub> - (29)<sub>10</sub> in a 16-bit processor that uses 2's complement to store a negative number.
- (b) State the difference between compiler and interpreter.
- (c) Design a flowchart to find the greatest common divisor (GCD) of two given integers.

**(2 + 2) + 2 + 6 = 12**

**Group – C**

4. (a) Write a C program that reads a real number  $x$  from the keyboard and calculates the sum of the series  $\exp(x) = \sum_{n=0}^{\infty} t_n$  for  $0 \leq n < \infty$ ,  $t_n = x^n / n!$  by adding terms as long as  $|t_n| > 10^{-8}$  (without computing factorial and power of  $x$ ).

(b) Write a program to print the following pattern: (number of rows to be printed will be given by the user)

```

      1
     2 3 2
    3 4 5 4 3
   4 5 6 7 6 5 4
  5 6 7 8 9 8 7 6 5

```

(c) Explain the output/error regarding the following code.

```

#include<stdio.h>
main()
{
    int num = 10;
    for(; --num; num=num/2)
        printf("%d ", num);
    return 0;
}

```

**5+ 5 + 2 = 12**

5. (a) A perfect number is a positive number in which sum of all positive divisors excluding that number is equal to that number. Write a C program that accepts a positive integer (You have to check the number which has been used as input is positive and integer, if not then you have to throw an error message and ask user to input a number again) from the keyboard and checks whether the entered number is a perfect number.

(b) Write a C program that accepts an integer and print next five prime numbers,

Example:

I/P: 10

O/P: 11 13 17 19 23

**6 + 6 = 12**

**Group – D**

6.(a) Explain the result of the following:

```

int n1 = 2, n2 = 3;
int *p = &n1, *q = &n2;
*p++ = *q++;

```

(b) Explain the output/error regarding the following code.

```

main()
{
    int arr[5], *parr;
    parr=arr;
    while(parr < &arr[5])
    {
        *parr = parr - arr;
        printf("%d", *parr);
        parr++;
    }
}

```

(c) Write a program that reads a square matrix of size  $n \times n$  and pass it to a function isUpper(). The function identifies whether the matrix is upper triangular. If yes, it returns a value '1', else it returns '0'. The matrix has to be allocated dynamically.

**3+ 3 + 6 = 12**

7. (a) (i) State the differences between macros and functions.  
(ii) State the differences between malloc() and calloc().

(b) Write a C function with the prototype given below:

```
char* fun(char *);
```

It will take one string as an input, then it will encrypt each word by shifting each alphabet to two alphabets ahead. Numbers and special characters remain unchanged.

I/P: "Fuzzy Logic"

O/P: "Hwbba Nqike"

**(2 + 2) + 8 = 12**

**Group – E**

8. (a)

```

struct {
    short int arr[5];
    union {
        float p;
        long int q;
    };
} a;
} b;

```

Assume that objects of the type short int, float, and long int occupy 2 bytes, 4 bytes and 8 bytes, respectively. What is the memory requirement for variable b? Explain.

(b) Define a structure called DATE containing three integers- day, month, and year. Write a program using functions to read date, to validate the date entered by the user and then print the date on the screen in the format *date/month/year* (eg. 1/2/2019). The validation rules should include the following:

- (i) day=31, month=6, year=2018 is not valid as June has 30 days only  
(ii) day=29, month=2, year=2018 is not valid as 2018 is not a leap year

(c) Write a short note on file handling.

**3 + 6 + 3 = 12**

9. (a) Write a C program, which will take a file name as a command line input and search that file in the current working directory. If the file is present in the current working directory it will return the size of the file.

(b) Write a C function to multiply two complex numbers, where the real and imaginary parts of the complex numbers will be passed as arguments.

**6 + 6 = 12**