(c)   What will be the output of the following code and why?

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

(d)   Explain the output of the following code snippet.
```
char s1[20], s2[20];
strcpy(s1,"KOLKATA");
strcpy(s2,"KOLKATA");
if(s1 == s2)
 printf("Names are same");
else
 printf("Names are different");
```

4+ (1+2) +3+2= 12

Group – E

8. (a)   What is the difference in opening a file in r+ and in w+ mode?

   (b)   Write a C program that will read a data file containing several lines of text and print number of lines and number of words present in the text.

   (c)
```
#include<stdio.h>
  struct st
  {
    int x;
    static int y;
  };

  int main()
  {
    printf("%d", sizeof(struct st));
    return 0;
  }
```
Is there any error in the above program? If yes, correct it. What will be the output of the program? Assume that the size of int is 4 bytes.

2 + 8 + 2=12

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

   (b)   What is the use of fseek( ) and rewind( ) functions in a file?

   (c)   What is the purpose of typedef feature? How is this feature used with structure?

8 +2 +2=12

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)   Which of the following is NOT a valid variable name declaration?
            (a) int _2a;   (b) int $2a;   (c) int 2a;   (d) int a2;

    (ii)   What is A, when it is declared as int *A[5] ?
            (a) An array of integers
            (b) A pointer to an array of integers
            (c) An array of pointers to integers
            (d) None of these.

    (iii)   How many times is the body of the loop executed?
```
int i;
for (i = 0; i < 100; i = i + 3)
     printf("i = %d", i);
```
            (a) 100   (b) 97   (c) 34   (d) 33.

    (iv)   big = a > b ? (a > c ? a : c) : (b > c ? b : c) ;
            (a) big will get the value of a   (b) big will get the value of b
            (c) big will get the value of c   (d) big will get the biggest value.

    (v)   The hexadecimal equivalent of $(44555221)_8$ is
            (a) 496D488   (b) 586D488   (c) 92131091   (d) 92DA91.

    (vi)   ROM stands for
            (a) Read Only Memory   (b) Random On-board Memory
            (c) Read Once Memory   (d) Read Only Module.

    (vii)   In which part of the program compilation process macros are dealt with?
            (a) Assembly   (b) Pre-Processing
            (c) Linking   (d) Loading

(viii) What will be the output of the following C code?
```c
#include <stdio.h>
int main()
{
int *ptr, a = 10;
ptr = &a;
*ptr += 1;
printf("%d,%d/n", *ptr, a);
}
```
    (a) 10, 10   (b) 10, 11   (c) 11, 10   (d) 11, 11.

(ix) The correct syntax to access the member of the ith structure in the array of structures is?
```c
struct temp
{
 int b;
}s[50];
```
    (a) s.b.[i];   (b) s[i].b;   (c) s.b[i];   (d) b.s[i];

(x) In IEEE754 a bit pattern 00000000000100000000000000000000 represents
    (a) 0   (b) $1.125 * 2-127$ (c) $2-129$ (d) -1.

Group – B

2. (a) Convert $(234.452)_{10}$ to Binary
Convert $(3AC.45)_{16}$ to Decimal

(b) Using 2's complement method, compute
i. $(-43)_{10} - (-23)_{10}$
ii. $(1011001)_2 - (1010)_2$

(c) Draw a flowchart to print all the prime numbers in the range 10 to 100.

(2 + 2) + (3 + 2) +3= 12

3. (a) Convert from one number system to another:
$(101101.110111)_2 = (?)_{16}$

(b) Calculate the radix r, $(121)_r = (144)_8$.

(c) Write an algorithm to calculate the GCD or HCF of two input numbers.

(d) What is the representation of 85.125 using the single-precision IEEE-754 floating point format?

2+ 4 + 4 + 2=12

Group – C

4. (a) Write a program to print the following pattern (number of rows will be the input from the user).
```
 *  *  *  *  *
    *  *  *  *
       *  *  *
          *  *
             *
```

(b) Write the output of the following program.
```c
int main ()
{
    int x=2, y, z ;
    x *= 3 + 2 ; printf ("%d\n", x);
    x *= y = z = 4; printf ("%d\n", x);
    x = y == z ; printf ("%d\n", x);
    x == ( y = z ) ; printf("%d\n", x);
    return 0;
}
```

(c) Can any of the three initial expression in a *for* loop be omitted? If so what is the consequence of each omission?

5+ 4 + 3=12

5. (a) Write a C program to print the following pattern (number of rows will be the input from the user).
```
      1
    1  2
   1  2  3
  1  2  3  4
```

(b) Write a C program to shift integer data by 2 bits to the left.

(c) Write the output of the following code snippet.
```c
int main()
{    int m, n = 15, x = 2 , y = 3, z = 1;
    m = (n > 10)? (x ++/ y || --z || ++y) :++z;
    printf("%d %d %d %d",m,x,y,z);
    return 0;
}
```

(d) Using ternary operator write a macro to find the absolute value of a number.

5+ 3 +2 + 2=12

Group – D

6. (a) Write a recursive program in C to reverse a string.

(b) Differentiate between function declaration and function definition?

(c) How does a local static variable behave differently from local variable in a function?

(d) What is a macro? How is it different from a function? Explain with an example.
5+ 2+2+ (1 + 2) = 12

7. (a) Write a C program to count the number of vowels and digits in a given string.

(b) What is dynamic memory allocation? Is it mandatory to use the free ( ) function? Justify your answer.