INTRODUCTION TO COMPUTING
(CSEN 1201)

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 main() in C?
(a) int (b) void (c) double (d) float.

(ii) In which system0 has two types of representation?
(a) 1's complement (b) 2's complement
(c) IEEE floating point representation (d) Both (a) and (b).

(iii) What will the output be?

```
int main(void)
{
  const int a = 10;
   int *p = &a;
  *p = 20;
    printf("%d",a);
     return 0;
}
```

(a) Compiler error (b) 10 (c) 20 (d) None of the above.

(iv) In file handling, fopen() is used for
(a) opening a file (b) closing a file
(c) reading from a file (d) writing to a file.

(v) Select the fastest memory unit.
(a) Register (b) Cache (c) RAM (d) Hard disk.

(vi) In which step of the program compilation process are macros processed?
(a) Assembly (b) Pre-processing
(c) Linking (d) None of the above.

(vii) The meaning of x = 3, 4, 5 is same as
(a) x = 5 (b) x = 3 (c) x = 3 OR 4 OR 5 (d) x = 4.

(viii) What will the output be?

```
int  n = 10;
void fun (int  x)
{
      static int r = x;
       if(r < 2)
  {
       printf("%d  %d ", n, r);
      fun(++ r);
}
  }
int  main (void)
{
      static int  n;
      fun(n);
      printf("%d",n);
}
```

(a) 10 (b) 10 0 10 1 0 (c) 10 0 10 1 1 (d) 10 0 10 1 10.

(ix) What will the output be?

```
#define SQUARE(X) X * X
int main ( )
{
   printf ("\n Square = %d" , SQUARE(10+2) );
   return 0;
}
```

(a) 144 (b) 100 (c) 32 (d) 34.

(x) variable p is a pointer to a two-dimensional array of integers, i.e., int arr[3][4]; then which of the following should the prototype of a function named fun() be , if the array "arr" is an argument to the function fun() and "rows" indicate the number of rows of the array "arr"

(a) void fun(int * p[4], int rows){ } (b) void fun(int (* p)[4],int rows) { }
(c) void fun(int p[ ][4],int rows){ } (d) both (b) and (c).

Group – B

2. (a) Design a flowchart to check whether a given integer is palindrome or not. Palindrome is a sequence of digits that reads the same backwards and forwards as (e.g. 1331,12321 etc).

(b) Convert from one number system to the other
(i) $(29.545)_{10} = (\ ?\ )_2$
(ii) $(364364364)_8 = (\ ?\ )_2$

(c) Simplify the expression –
$(A + C)(AD + A\overline{D}) + AC + C$

5 + (2 × 2) + 3 = 12

3. (a) Calculate, step by step, the IEEE-754 32-bit full precision floating point representation of -2612.925.

(b) State the differences between compiler and interpreter.

(c) What is a universal logic gate?

(d) Design XNOR gate using minimum number of NOR gates.

6 + 2 + 1 + 4 = 12

Group – C

4. (a) Write a menu driven program in C with three menu options -
1. Check if the integer is prime
2. Print the binary equivalent of an integer
3. Exit

If any input other than 1-3 is provided, the program should print "invalid input" and should show the menu again prompting the user for another input. Use switch-case to build the menu and call separate functions to get the results for options 1 and 2.

(b) Write a program in C to print the following pattern where the number of stars in the longest row is provided by the user (as n). Here, n is 5. Write the program such that it will work for any value of n.

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

(c) What will the following piece of code print and why?

```
int c = 0;
if(c=4)
    printf("False");
else
    printf("True");
```

7 + 4 + 1 = 12

5. (a) Write a program in C to express a sum of money into minimum number of notes/coins needed and their denominations. Example: 1252 will return 2 notes of 500, 2 notes of 100, one note of 50 and one coin of 2.
(Assume denominations of Rs. 2000, 500, 100, 50, 20, 10, 5, 2, 1)

(b) Write a program in C to print Pascal's triangle without calculating factorial. User should be able to provide the index of the final row as the input (n). The program should work correctly (i.e, print the values of each row correctly with proper spaces) for at least n = 20. In the figure below, n = 7. For n = 0, only 1 will be printed and for –ve integer inputs "invalid input" should be printed.


```
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
```

(c) What is the difference between an entry-controlled and an exit-controlled loop?

4 + 7 + 1= 12

Group – D

6. (a) Write a program in C to print this pattern, where the number of rows will be taken as an input from the user. (For example if number of rows = 4 then the pattern will look in like this)

```
1
2 2
3 3 3
4 4 4 4
```

(b) Write a recursive program to find gcd (greatest common divisor) of two numbers.

6 + 6 = 12

7. (a) Write a program in C to
i) input a string, which is a few lines in length.
ii) find out the total number of words and sentences

Make the necessary assumptions for understanding the words and the sentences. State them clearly before writing the program.

(b) i) State the differences between macros and functions.
ii) State the difference between the following two declarations
int* p(int x , char * p), int (*p) (int x , char * p)

6 + (3 + 3) = 12

Group – E

8. (a) Write a function in C with the prototype given below:

char* fun(char *);

It will take one string as an input then it will change the lowercase alphabets to uppercase and uppercase alphabets to lowercase and finally it will return the transformed string

(For example if the input string is "This is HIT" output string will be "tHIS IS hit")

(b) Write a program in C to read and print the student details (i.e Name, Roll No. Mobile No) using structure and dynamic memory allocation. (N.B: At the point of data insertion you have to make sure that each student should have unique roll number, means roll numbers should be auto generated at the point of input.)

6 + 6 = 12

9. Write short notes on any two-
(i) Structure, (ii) Dynamic memory allocation
(ii) File handling & (iv) Command line argument

6 + 6 = 12