PROGRAMMING FOR PROBLEM SOLVING
(CSE1001)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Which of the following is the 2's complement representation of -8 in a 4-bit storage space?
(a) 1011 (b) 1000 (c) 1101 (d) 1100

(ii) What is the octal representation of $(AB34.F9)_{16}$?
(a) $(125464.762)_8$ (b) $(135464.763)_8$
(c) $(124464.762)_8$ (d) $(126454.762)_8$

(iii) Which escape character can be used to begin a new line in C?
(a) \a (b) \b (c) \t (d) \n

(iv) How many times is the body of the loop executed?
```
int i;
for (i = 0; i < 100; i ++);
        if (i=1)
                printf("%d",i);
        else
                printf("%d",i+1);
```
(a) 100 (b) 1 (c) 101 (d) infinite loop

(v) Meaning of x /= 3 is same as,
(a) x = 2 (b) x = 3 (c) x = x / 3 (d) x = 4

(vi)
```
#include<stdio.h>
#define SQUARE(X) X*X;
int main ( )
{
printf ("\n Square = %d" , SQUARE(5+2) );
return 0;
}
```
(a) 25 (b) 17 (c) 49 (d) COMPILATION ERROR

(vii) Given the following declarations and an assignment statement, which one of the given options is equivalent expression for str[4]?

```
char str[10], *p;
        p=str;
```

(a) p + 4 (b) *p + 4 (c) *(p + 4) (d) p[3] + 1

(viii) What will be the output of the following C code?

```
#include <stdio.h>
int main( )
{
int ary[4] = {1, 2, 3, 4};
int *p = ary + 3;
printf("%d %d\n", p[-2], ary[*p - 1]);
}
```

(a) 2 3 (b) Compile time error (c) 2 4 (d) None of these

(ix) What is the return type of the fopen() function in C?
(a) char * (b) bool (c) FILE * (d) void *

(x) What is the function feof( ) used for in C?
(a) To close a file (b) To write to a file
(c) To check if the end of file has been reached (d) To flush the file buffer

Fill in the blanks with the correct word

(xi) $(562.75)_{10}$ = (_____)$_2$

(xii) An Ampersand (&) when used before the name of a variable in a c program, then it denotes _____ of the variable.

(xiii) The size of an array int arr[10]; is _____ bytes, assuming an integer is 4 bytes.

(xiv) The correct way to access a member *age* of a structure pointer *ptr* is _____.

(xv) The _____ statement is used to skip the current iteration of a loop and proceed to the next one.

Group - B

2. (a) Draw a flowchart to check whether a given number is a palindrome or not. *[(CO3)(Apply/IOCQ)]*

(b) From $(1101001)_2=(405)_x$ find out the value of x. *[(CO2)(Apply/IOCQ)]*

(c) Using 8 bit 2's complement representation find out the outcome of $(67)_{10} - (84)_{10}$. *[(CO2)(Apply/IOCQ)]*

6 + 3 + 3 = 12

3. (a) Convert the following numbers from one number system to the specified one:
(i) $(0.865)_{10}$ = (?)$_8$
(ii) $(4D.21)_{16}$ = (?)$_{10}$
(iii) $(24.36)_8$ = (?)$_{10}$
(iv) $(1111.1101)_2$ = (?)$_{10}$ *[(CO2)(Apply/IOCQ)]*

(b) Consider the following declaration of a variable in your C program: float x=12.75; Show the 32 bit pattern that will represent x in the memory, using IEEE754 floating point representation. *[(CO2)(Apply/IOCQ)]*

(2 + 2 + 2 + 2) + 4 = 12

Group - C

4. (a) What is type conversion in C language? Explain it with a suitable example. *[(CO3)(Remember/LOCQ)]*

(b) Write a C program to find the sum of all digits of an integer number. For example, if the input value is 123, then the sum will be 1+2+3=6. *[(CO3,CO5)(Analyze/IOCQ)]*

(c) Explain Switch-Case statement using a suitable program as an example. *[(CO2,CO3)(Remember/LOCQ)]*

(d) Write a C program to find the biggest of three numbers, where the numbers will be taken from the user. *[(CO3,CO5)(Apply/IOCQ)]*

2 + 4 + 3 + 3 = 12

5. (a) Write a loop structure in the following three ways to calculate the sum of every third integer starting from i=2. (i.e., calculate the sum 2+5+8+11+...) where all values of i are less than 100.
(i) Using a for loop
(ii) Using a while loop
(iii) Using a do-while loop *[(CO5,CO6)(Analyse/HOCQ)]*

(b) Replace the following if-else statement written in C by ternary operator:

```
if (x + y >= 30)
        value = 30;
 else if (x + y >= 25)
         value = 25;
else
        value = 20;
```

[(CO3,CO4,CO6)(Apply/IOCQ)]

(c) What is an infinite loop? Provide an example and explain how to prevent it. *[(CO2,CO3)(Remember/LOCQ)]*

6 + 3 + 3 = 12

Group - D

6. (a) Allocate a 1D array of integer of size n dynamically where n is a user input. Store values in it and then print the average of all array elements. *[(CO3, CO5)(Analyse/IOCQ)]*

(b) What is a string in C? How is it different from a character array? *[(CO3)(Analyse/IOCQ)]*

(c) Write a recursive function to calculate the factorial of an integer n (user input). Is recursive approach better than the iterative one? Explain your answer with supporting reasons. *[(CO5, CO6)(Apply/HOCQ)]*

5 + 2 + (3 + 2) = 12

7. (a) Why is the static keyword used in C? Explain with an example *[(CO3)(Analyse/IOCQ)]*

(b) Write a function to calculate the sum of each row of a two-dimensional array. Also write the main() function to show the function call. *[(CO4,CO5)(Apply/HOCQ)]*

(c) Discuss the relationship between arrays and pointers in C. *[(CO3, CO4)(Analyse/IOCQ)]*

(1 + 2) + 6 + 3 = 12

Group - E

8. (a) How can you check whether a file exists by using the fopen() function? *[(CO5,CO6)(Understand/LOCQ)]*

(b) Create a structure that has two elements, one is name and the other is marks. Create an array of structure of size 5. Enter data in the array by accepting values from user. Print the name who secured minimum marks. *[(CO5)(Evaluate/IOCQ)]*

3 + 9 = 12

9. (a) Write a C program that counts and prints the total number of characters in a given text file. The input file's name should be specified as a command line argument. *[(CO4, CO6)(Apply/HOCQ)]*

(b) Write a program to compare two dates entered by user. Create a structure name Date to store the date elements i.e. day, month and year. If the dates are equal, display "Dates are equal" otherwise display " Dates are not equal". *[(CO4, CO6) (Understand/IOCQ)]*

6 + (2 + 2 + 2) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	11.4	64.6	24