B.TECH/BT/CE/CHE/CSE(AI&ML)/CSE(DS)/CSE(IOT&CS)/EE/ME/1ST SEM/CSEN 1001/2022

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 <u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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 will be output of following c program?

```
int main( ){
 int i=0;
 for(i=0;i<20;i++){
 switch(i){
 case 0:i+=5;
 case 1:i+=2;
 case 5:i+=5;
 default: i+=4; break;
 }
 printf("%d ",i);
 }
 return 0;
}
```

(a) 0 5 9 13 17 (b) 5 9 13 17 (c) 12 17 22 (d) 16 21.

(ii) What is the range of unsigned short int?

(a) 0 to 65535 (b) -128 to 127 (c) 0 to 255 (d) -32,768 to +32767.

(iii) What is the default return type of functions?

(a) int (b) char (c) float (d) double.

(iv) What is the output of this C program?

```
int main( ){
 char *s= "hello";
 char *p = s + 2;
 printf("%c\t%c", *p, s[1]);
 return 0;
}
```

(a) l e (b) h e (c) l l (d) h l.

(v) Select the fastest memory unit

(a) Cache (b) Register (c) RAM (d) Hard disk

(vi) What will be the output of the following code snippet?

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

(a) 144 (b) 32 (c) 122 (d) 12

(vii) The meaning of the declaration int(*ptr)[10]; is
(a) ptr is array of pointers to 10 integers
(b) ptr is an array of 10 integers
(c) ptr is a pointer to an array of 10 integers
(d) ptr is an pointer to array.

(viii) What will be the output of the following program segment?

```
void junk (int i, int *j) {
 i = *j * *j;
 * j = i * i;
}
int main (void) {
 int i = 5, j = 2;
 junk (i, &i);
 printf( "%d, %d", i, j);
 return 0;
}
```

(a) 4, 25 (b) 25, 4 (c) 625, 2 (d) 625, 25.

(ix) What is the output of the following code snippet?

```
int main(void){
 enum { india, is=7, GREAT };
 printf("%d %d", india, GREAT);
 return 0;
}
```

(a) 0 1 (b) 0 2 (c) 0 8 (d) 1 2.

(x) Suppose x is an unsigned int variable. Executing x >> 3 is same as,
(a) x/3 (b) x*(2^3) (c) x*3 (d) x/(2^3).

Group – B

2. (a) What will be the 32-bit full precision floating point representation for 24.75? [(CO1)(Remember/LOCQ)]
(b) State the differences between Compiler and Interpreter. [(CO2)(Understand/LOCQ)]
(c) Draw a flowchart to print the first n Fibonacci numbers. [(CO2)(Analyze/IOCQ)]

6 + 2 + 4 = 12

3. (a) Convert from one number system to the other: (i) $(29.65)_{10}$ = $(?)_2$
(ii) $(364364364)_8$= $(?)_{16}$ [(CO1)(Analyze/IOCQ)]

(b) What are 2's complement numbers? How do you use 2's complement method to compute $(51)_{10} - (37)_{10}$ in binary? [(CO1)(Evaluate/IOCQ)]

(c) Draw a flowchart to find the sum of all integers in the range of 100 and 400 which are divisible by 3. [(CO2)(Analyze/IOCQ)]

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

Group – C

4. (a) Solve the output of the following codes and comment on your answer.

i)

```
#include <stdio.h>
int main( )
{
        int x = 1;
        int y = -1;
        if (x == 50 || ++y) {
                printf("if block executed\n");
                printf("Value of y: %d", y);
        }
        else {
                printf("else block executed\n");
                printf("Value of y: %d", y);
        }
        return 0;
}
```

ii)

```
#include <stdio.h>
int main(void)
{
  int a = 20;
  int b = -5;
  if (a != 20 && b == -5) {
    printf("I won't be printed!\n");
  }
  printf("Programming for problem
solving\n");
  return 0;
}
```

[(CO3)(Create/HOCQ)]

(b) 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;
}
```

[(CO3)(Analyze/LOCQ)]

(c) Write down a loop structure in the following three way, that will calculate the sum of every third integer, beginning with i = 2 (i.e., calculate the sum 2 + 5 +8 + 11 + …) and for all values of i that are less than 100.

(i) using a while loop. (ii) using a do - while loop.

(iii) using a for loop. [(CO5)(Analyze/IOCQ)]

(2 + 2) + 2 + 6 = 12

5. (a) Explain explicit and implicit type casting with an example. How would you use the typecasting technique to round off a floating point number? [(CO3,CO5)(Understand/IOCQ)]

(b) Discuss how a local static variable behave differently from a local variable in a function? [(CO6)(Create/HOCQ)]

What value does the function call fun(5) return, when 'fun' is defined as follows?

```
int fun (int n) {
 if ( n == 0)
 return 1;
 return 2 * fun ( n – 1 );
}
```

(c) Consider the following function prototype:

```
void swap(int*, int*);
```

Write the body of the function and use it to swap two integers. Write the driver program to implement the function. [(CO3)(Analyze/IOCQ)]

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

Group – D

6. (a) A C program contains the following declaration.
float table[2][3] = {{ 1.1 , 1.2, 1.3}, {3.1, 3.2, 3.3}};
What are the values of the following?
(i) *(*(table + 1) + 1)
(ii) *(*(table) + 1)
(iii) *(*(table + 1)) [(CO3)(Analyze/HOCQ)]

(b) Write a recursive function and a non-recursive/iterative function in C to find the factorial of a number. Which one is better and why?
Is it always possible to convert a recursive problem to a non-recursive/iterative one? [(CO5,CO6)(Apply/HOCQ)]

(c) Write a C code to add two matrices where matrices will be allocated dynamically. [(CO5)(Apply/HOCQ)]

3 + (3 + 2) + 4 = 12

7. (a) Write a program to print the following pattern (number of rows will be the input from the user). [(CO5)(Apply/HOCQ)]

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

(b) Write a program in C to delete an element from a particular position in an array. Position will be taken from keyboard as input. After the deletion, the array elements must be in continuous locations. [(CO5)(Analyze/IOCQ)]

6 + 6 = 12

Group – E

8. (a) Write a program to compare two dates entered by user. Make a structure named Date to store the elements day, month and year to store the dates. If the dates are equal, display "Dates are equal" otherwise display "Dates are not equal". [(CO6)(Analyze/IOCQ)]

(b) What are the different types of file opening mode? How can you check whether a file exists by using the fopen( ) function? [(CO3)(Analyze/IOCQ)]

(c) State the use of fseek( ). [(CO3)(Analyse/IOCQ)]

6 + (2 + 2) + 2 = 12

9. (a) Consider the statement
float result = 36.0/SQUARE(2+1);
For each of the four versions of the macro SQUARE( ) below, what will be the corresponding value of 'result' ?
    i. #define SQUARE(x) x*x
    ii. #define SQUARE(x) (x*x)
    iii. #define SQUARE(x) (x)*(x)
    iv. #define SQUARE(x) ((x)*(x)) [(CO5)(Create/HOCQ)]

(b) Write a C program to count the number of characters, lines and words in a text file. The filename should be provided as a command line argument. [(CO5)(Apply/IOCQ)]

(c) State the difference between the file open modes "r+" and "w+".
[(CO2)(Understand/LOCQ)]

4 + 6 + (1 + 1) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	12.5	56.25	31.25

Course Outcome (CO):

After the completion of the course students will be able to
CO 1: Understand and remember functions of the different parts of a computer.
CO 2: Understand and remember how a high-level language (C programming language, in this course) works, different stages a program goes through.
CO 3: Understand and remember syntax and semantics of a high-level language (C programming language, in this course).
CO 4: Understand how code can be optimized in high-level languages.
CO 5: Apply high-level language to automate the solution to a problem.
CO 6: Apply high-level language to implement different solutions for the same problem and analyze why one solution is better than the other.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question