SEAT NO. CT-23025

NED UNIVERSITY OF ENGINEERING & TECHNOLOGY

FIRST YEAR(Bachelor of Science in Computer Science)

(Specialization in Data Science/Artificial Intelligence/Gaming and Animation))

FALL SEMESTER EXAMINATIONS 2023

Batch 2023

Time : 3 Hours

Dated : 29-JAN-24

Max Marks : 60

Programming Fundamentals - CT-175

Question 1 [CLO-1] **15 Marks**

a. What are the values of x and y when the loop terminates? Dry run the program and **show** step by step results. [10 marks]

```
int main()
{
   int a=8,b=13,x=0,y=10;
   for ( k = --a;  k < b;  k++ )
   {
      x = x + k;
      y = y - x--;
   }
```

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```
int main()
{
 int x, y;
 x = 24;
 y = 60;
 while (((y - x) % 5) != 0)
 {
  printf("%d ", y);
  y = y - 7;
 }
}
```

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b. Explain the order of execution of functions in the following code and also draw the system call stack to represent its status after every function call. [05 marks]

```
int main()
{
   int n, r;
   float p,c;
   p = fact(n)/fact(r);
   c = fact(n)/fact(r)*fact(n-r);
}
```

Question 2 [CLO-1] **15 Marks**

a. **Explain** the difference between arguments and parameters with example?

b. **What** is the scope of a variable? Can a function access a variable defined in another function?

c. **How** is a global variable stored in main memory. What is the advantage of a global variable over a local variable?

d. **What** is the difference between calling a function by value or reference?

e. Using int len variable that contains the number of elements of a float array as user input, **write** a statement to allocate dynamic memory for this array called percentage.

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f. **Explain** how a string s[25] = "Programming Languages" will be stored in main memory starting form address 2000 by drawing its memory representation.
g. **What** is the difference between static and dynamic memory allocation?
h. **Calculate** the address of fourth element stored in int num[10] if the pointer variable num contains 2000. Assume int takes 4 bytes in memory.
i. **Why** do we require the call stack for successful function calls?
j. **What** modes can be used to access any file in C.
k. A batch advisor stores the marks of 50 students in her class for 7 subjects by using a 2D array declared as `int marks[7][50]`. **Write** the statement(s) required to print all the marks for a student bearing roll no. 37.
l. **What** will be the output of: (A < B) && !(A < B)?
m. **What** is recursion? To calculate factorial we can make an iterative or a recursive function, which one according to you is better? And why?
n. How do we pass array to a function? **Explain** with example.
o. **Write** a statement to print the value and address of a variable by using its pointer int * ptr.

Question 3 [CLO-2] **10 Marks**

a. **Write** a program that takes a 4X4 matrix as input and displays it by reading "even" indexed row forward & "odd" indexed rows backward. [5 marks]

SAMPLE INPUT	SAMPLE OUTPUT
23 14 28 92 15 77 47 2 22 88 66 51 29 30 86 100	23,14,28,92,2,47,77,15,22,88,66,51,100,86,30,29

b. **Write** a program that takes array of size provided by user and initializes it with random numbers between 0 to 9. Print the values and perform deletion on index specified by the user. [5 marks]

Question 4 [CLO-2] **10 Marks**

An integer number is said to be a perfect number if its factors, including 1 (but not the number itself), sum to the number. For example, 6 is a perfect number because $6 = 1 + 2 + 3$.

a. **Write** a function perfect that determines whether a parameter number is a perfect number. Print the factors of each perfect number to confirm that the number is indeed perfect.
[7 marks]

b. **Use** this function in a program that determines and prints all the perfect numbers between 1 and 1000. [3 marks]

Question 5 [CLO-2] **10 Marks**

a. **Define** the operators in detail? What are the different types of operators? What do you understand from operator precedence and associativity [2 marks]
b. Write programs that **perform** the following tasks? [8 marks]
   i. Programs asks the user to enter a number and the program prints its factorial
   ii. Program asks the user to enter a range for which the table of numbers would be printed
   iii. Program asks the user to enter a sentence from the keyboard in one case and prints it on the output console in another case. [Hint lowercase to uppercase and vice versa.]
   iv. Program asks the user to enter the number of lines for which pyramid of starts would be printed on the output screen