2019

MSc

2ND Semester Examination

COMPUTER SCIENCE

PAPER – COS-292(M1+M2)

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their Own words as far as practicable.

Illustrate the answers wherever necessary.

(Module-1)
OOPs Lab

Answer any **ONE** question :   20x1=20

1. Create a class to calculate GCD and LCM of two numbers. Add suitable constructors in the class. Also, add other necessary member functions and variables in the class. The class should calculate both GCD and/or LCM of the given numbers. Test the class in your program.

2. Create a class for prime numbers. Add necessary function to check whether a given number is a prime or not. The class should also print all prime numbers within a given range.

3. Create a class to print Fibonacci series within a given range. The class should check whether a given number is a Fibonacci number or not. Write appropriate member function to get nth Fibonacci number.

4. Design an abstract class and an interface with suitable member functions and variables. Write other classes to show the differences between an abstract class and an interface.

5. Write a program in Java to implement multithreading and thread synchronization. Create at least two threads in your program. Other necessary classes, member functions and variables may be added.

6. Create a class for Armstrong numbers. The class should check whether a given number is an Armstrong number or not. The class should also print all Armstrong numbers within a given range.

7. Write a program in Java to print all possible combinations of digits of a given number. (If the number is 123 then combinations will be: 123, 132, 213, 231, 312,321)

8. Write a program in Java that reads a multiline text as input. The program should print the number of sentences, words, characters, and digits used in the text.

9. Write a program to show exception handling in Java using try, catch and finally block in the program.

(Continued)

10. Write a Java program to draw at least two standard figures, some text and an image in an Applet. Use different colors for figures and texts.

11. Write a Java program to compute following

1! -2! + 3! − 4!+ ... + /- n!

12. Write a Java program to sort 10 names in alphabetical order.

13. Write a Java program to create a package called "Arithmetic" that contains Method to deal with all arithmetic operations.

14. Write a Java program to count the vowels and consonants in a given sentence.

15. Write a Java program to insert a name into a sorted list of names in ascending order.

(Module-2)
R Lab

Answer any *ONE* question   20x1=20

1. R has a built-in constant, 'letters', which contains the lowercase letters. Select first 20 letters of the alphabet from 'letters'. Store the vowels and consonants from these letters in two separate vectors. Create a list with these vectors.

2. Create a new environment called 'my.env'. Create a variable inside it. Access the variable inside the new environment. Delete the variable inside that environment.

3. Create a vector with some names. Get the length of the vector. Get the first two names from the vector. Get the 3rd and 5th name. Sort the names using 2 methods. Reverse the names in the vector.

4. Get the last 10 rows from 'iris' dataset. Get rows with Sepal. Width > 3.6 from iris. Get the rows with 'virginica' species from the data set.

5. Write an R program with recursive function to calculate the factorial of a given number.

6. Create a list variable that contains all the square numbers in the range 0 to 9 in the first element, in the range 10 to 19 in the second element, and so on, up to a final element with square numbers in the range 90 to 99. Numbers with square less than 100 should be included as the last element in the list.

7. Write a function that accepts a vector of integers and returns a logical vector TRUE whenever the input is even, FALSE whenever the input is odd, and NA whenever the input is non-finite. Check that the function works with positive, negative, zero and non-finite inputs.

8. Write a function that accepts another function as an input and returns a list with two elements: the first element should contain a list of the input function's formal arguments, and the second element should contain the input function's body.

9. 'state.x77' is a dataset that is supplied with R. It contains information about the population, income and other factors for each US state.
   i) Inspect the dataset using the method str(), summary() etc.
   ii) Find the mean and standard deviation of each column.

10. Create a student data frame with roll, name and marks column. The data frame should contain at least 10 records.
   i) Arrange the records according to the marks obtained by the students. The name should come alphabetically when their numbers are same.
   ii) Add an extra column named result which shows P for pass and F for fail depending on their marks.

Viva Voce: 5

P.N.B: 5