2019

MSc

2nd Semester Examination

APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

PAPER – MTM-297

Full Marks : 25

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.

Lab.: (Language: C Programming with Numerical and Statistical Methods)

Answer ***ONE*** question from each group (questions to be selected by lottery)

Group-A **(1x8)**

1. Write a program in C to search a number from a dynamic list of sorted numbers by Binary search technique.

2. Write a program in C to sort a dynamic list of numbers by Insertion sort technique.

3. Write a program in C to find a number of occurrence of a given letter in a given file.

4. Write a program in C to rewrite names given in a file as surname first, allowed by comma and initials first and middle name.

5. Write a program in C to sort a list of names given in a file as alphabetic order.

6. Write a program in C to search a given word in a given text file.

7. Write a program in C to count the characters, words and line in a given text file.

8. Write a program in C to convert the letter contains in a given text file as upper case to lower case and vice versa.

9. Write a program in C to count the number of vowels, consonants and space in a given text file.

10. Write a program in C to search a given number from a file which is contained list of numbers.

Group-B

1. Write a program in C to find out the correlation coefficient for a set of points $(x_i + y_i)$ using dynamic memory allocation. 1x12

2. Write a program in C to find a real root of an equation $x^3 - 8x - 4 = 0$ by Regula-Falsi method.

3. Write a program in C to find the solutions of a system of linear equations

$$-3x_1 + x_2 - 5x_3 = 12$$

$$x_1 + 2x_2 + 4x_3 = 11$$

$$x_2 + 2x_3 = 5$$

by Guass-Seidal method.

4. Write a program in C to find the solutions of a Tri-diagonal system of equations

$$x_1 + x_2 = 3$$

$$x_1 + x_2 - 3x_3 = -3$$

$$-2x_2 + 3x_3 = 4$$

5. Write a program in C to find the value of integration $\int_1^2 (x2 + 1)dx$ by Weddle's Rule.

6. Write a program in C to find the solutions of a system of linear equations

$$-3x_1 + x_2 \quad 5x_3 = 12$$

$$x_1 + 2x_2 + 4x_3 = 11$$

$$x_2 + 2x_3 = 5$$

by LU decomposition method.

7. Write a program in C to find y(0.4) by solving the differential equation

$\frac{dy}{dx} = x^2 - y^2$, $y(0) = 1$ by Runge-Kutta Fourth Order method using step length 0.1.

8. Write a program in C to find y(0.4) by solving the differential equation.

$\frac{dy}{dx} = x - y$, $y(0) = 1$ by Milne's Predictor Corrector method using step length 0.05.

9. Write a program in C to find f(2) by Lagrange Interpolation Technique given that f(1) = 1.500, f(3) = 2.232, f(4) = 2.500, f(5) = 2.736 and f(6) = 2.949.

10. Write a program in C to find the approximate largest Eigen value (in magnitude) and the corresponding Eigen vector of the following matrix by Power method

$$\begin{pmatrix} 2 & 3 & 1 \\ 3 & 2 & 2 \\ 1 & 2 & 1 \end{pmatrix}$$

(Notebook & Viva: 05)