B. PHARMACEUTICAL TECHNOLOGY 1ST YEAR 2ND SEMESTER EXAM-2019

Subject: Numerical Methods and Computer Programming

Time: 3 Hours **Full Marks: 100**

Note: Attempt any *five* questions.

Q 1.

a) Explain the relational operators in C++ programing language.

b) Write a program to find the maximum and minimum of three numbers taken from the user.

c) Write a program to compute the factorial of a number taken from the user.

d) Write a program to find the sum of the following series S, where n taken from the user.

$S = 1 + 3 + 5 + 7 + \ldots\ldots + n$ **[3 + 7 + 5 + 5 = 20]**

Q 2.

a) What is an array? How to define a two dimension array?

b) Write a program to find the average of the elements of an integer array.

c) Write a program to print the following output patterns for n (taken from user) lines.

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d) Write a program to find the sum of two matrixes of dimension m x n (m and n taken from user). **[3 + 5 + 6 + 6 = 20]**

Q 3.

a) Round-off the following numbers correct to four significant digits:

i) 4985561 ii) 35.46735 iii) 30.0567 iv) 0.00032217

b) Suppose 1.732 is used as an approximation to $\sqrt{3}$. Find the absolute, relative errors and percentage error.

c) Find the roots of the equation $x^2 + 5x + 1 = 0$ correct up to four significant figures.

d) Write down the flowchart for Regula-Falsi method to find out the root of an equation f(x) = 0.

e) Perform five iterations of the bisection method to obtain the smallest positive root of equation $f(x) \equiv x^3 - 5x + 1 = 0$.

[2 + 3 + 4 + 6 + 5 = 20]

Q 4.

a) Write down the algorithm for Newton-Raphson iterative method to find the root of an equation f(x) = 0.

b) Evaluate $\sqrt{12}$ up to four decimal places by Newton-Raphson method.

c) Find a real root of the equation $x = e^{-x}$ using the Newton-Raphson method, correct up to three decimal places.

d) Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of false position, correct up to three decimal places.

[6 + 4 + 5 + 5 = 20]

Q 5.

a) Compute the value of f(x) for x = 2.5 using Lagrangian interpolating formula from the following table:

x:	1	2	3	4
y:	1	8	27	64

b) Derive Newton's forward difference interpolation formula.

c) The population of a town in the decimal census was as given below. Estimate the population for the year 1895 using Newton's forward difference interpolation formula.

Year x:	1891	1901	1911	1921	1931
Population y: *(in thousands)*	46	66	81	93	101

d) The population of a town given below. Estimate the increase in population during the period 1955 to 1961 using Newton's backward difference interpolation formula.

Year x:	1921	1931	1941	1951	1961	1971
Population y: *(in Lakhs)*	20	24	29	36	46	51

[4 + 6 + 5 + 5 = 20]

Q 6.

a) Write down the algorithm of Simpson's 1/3 rule for evaluating $I = \int_a^b f(x)dx$.

b) Derive Trapezoidal rule on integrating Newton's forward difference formula.

c) Use Trapezoidal rule to evaluate $\int_0^1 x^3 dx$ considering five subintervals.

d) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 1/3 rule taking h = 1/4

[5 + 5 + 5 + 5 = 20]

Q 7.

a) Solve the following system of linear equations using Gauss elimination method:

$$2x + 8y + 2z = 14$$
$$6x + 6y - z = 13$$
$$2x - y + 2z = 5$$

b) Find the inverse of A using Gauss-Jordan method, where

$$A = \begin{bmatrix} 2 & 3 & 1 \\ 5 & 0 & -2 \\ 0 & 4 & 3 \end{bmatrix}$$

c) What do you mean by diagonally dominant of a matrix?

d) Solve the following system of linear equations by Gauss-Seidel method:

$$9x + 4y + z = -17$$
$$2x - 2y - 6z = 14$$
$$x + 6y = 4$$

[6 + 6 + 1 + 7) = 20]
