Roll No. ....

DD–2763

B. A./B. Sc./B. Sc. B. Ed. (Part III) EXAMINATION, 2020

MATHEMATICS

(Optional)

Paper Third (D)

(Programming in C and Numerical Analysis)

Time : Three Hours

Maximum Marks : 30

Note : Attempt any *two* parts from each Unit. Each part carries equal marks.

Unit—I

1. (a) Write the different types of loop in C language with proper syntax.

   (b) Define a term "String." Make a list of String functions with suitable program segments.

   (c) Explain the term "Algorithm." How is Algorithm different from Flow Chart ?

Unit—II

2. (a) Using Regula-Falsi method, find the real root of the following equation correct to three decimal places :

$$x \log_{10} x - 1.2$$

(b) Express the function $\frac{x^3 + x - 3}{x^3 - 2x^2 - 2x + 2}$ as sums if partial fraction using Lagrange's Interpolation formula.

(c) Derive the Newton's method for finding the qth root of a positive number N, N1/q, where N > 0, q > 0. Hence compute 171/3 correct to four decimal places, assuming the initial approximation as $x_0 = 2$.

Unit—III

3. (a) Apply Guass elimination method to solve the equations :

$$2X + Y + Z = 10$$
$$3X + 2Y + 3Z = 18$$
$$X + 4Y + 9Z = 16$$

(b) Solve the following system of equations using LU Decomposition method :

$$X_1 + X_2 + X_3 = 1$$
$$4X_1 + 3X_2 - X_3 = 6$$
$$3X_1 + 5X_2 + 3X_3 = 4$$

(c) Use the Jacobi method to approximate the solution of the following system of linear equations :

$$5X_1 - 2X_2 + 3X_3 = -1$$
$$-3X_1 + 9X_2 + X_3 = 2$$
$$2X_1 - X_2 - 7X_3 = 3$$

Continue the iterations until two successive approximations are identical when rounded to three significant digits.

Unit—IV

4. (a) Solve the following using Runge-Kutta method of order 4 for $0 \le x \le 2$. Use a step size of $h = 0.2$:

$$\frac{dy}{dx} = (x + y)\sin xy$$
$$y(0) = 5$$

(b) Apply Euler method to find the solution of :

$$\frac{dy}{dx} = \sin(x + y) - e^x$$
$$y(0) = 4, \quad \text{use } h = 0.1.$$

(c) Explain methods based on numerical differentiation.

Unit—V

5. (a) Explain Statistical test of pseudo-random number.

(b) In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10, use Poisson distribute on to calculate the approximate number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10000 packets.

(c) Write a short note on error analysis for Monte-Carlo integration.