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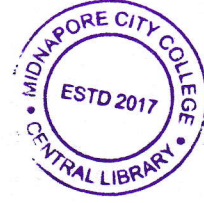**PG CBCS**
M.Sc. Semester-II Examination, 2022
(Mathematics)
PAPER: MTM 297
(C PROGRAMMING WITH NUMERICAL METHODS)

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.

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

Group-A   **1 × 8**

1) Write a programme in C using function to check a string is palindrome or not.

2) Write a programme in C to find a letter in string using function.

3) Write a program in C to reverse a string using function.

4) Write a programme in C to find a number from set of data series by binary search technique.

5) Write a programme in C to sorting the elements in a data series by bubble sort technique.

6) Write a programme in C to count the number of occurrences of letter in a string.

7) Write a program in C to create two vectors for two polynomials using dynamic memory allocation and find the products of them.

8) Write a program in C to create two matrices using dynamic memory allocation and perform addition and subtraction operations among them.

9) Write a program in C to create two matrices using dynamic memory allocation and perform multiplication and transpose operations among them.

10) Write a program in C to create a vector and a matrix using dynamic memory allocation. Then solve a system of linear equations.

Group-B   **1 × 12**

1) Write a C programme using function to solve the following ODE and find the value of $f(1)$ using Runge-Kutta method.
$\frac{dy}{dx} = y - x^2 + 1$, y(0)=0.5.

[P.T.O]

[2]

2) Find matrix inverse by Gaussian elimination with partial pivoting via C programming. Consider general $n \times n$ matrix.

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 system of linear equations

$$-3x_1 + x_2 - 5x_3 = -12$$
$$x_1 + 2x_2 + 4x_3 = 11$$
$$x_2 + 2x_3 = 5$$

by LU decomposition method.

5) Write a programme in C using function to find the value of y from a differential equation, by 4th order R.K method.

6) Write a programme in C using function to find a root using fixed point iteration method correct up to 5 decimal places.

7) Write a program in C to find the value of integration $\int_1^2 (x^2 + 1)dx$ by Monte Carlo technique.

8) 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 Milne's Predictor Corrector method using step length 0.05.

9) Write a program in C to find the largest Eigen value and the corresponding Eigen vector of the following matrix using Power method.

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

10) Write a program in C to find the natural cubic spline interpolation for the following information:

x	0.15	0.17	0.18	0.21	0.23
y	0.14944	0.16918	0.18886	0.20846	0.22798

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