# MA/MSCMT-08

## December - Examination 2019

# M.A. / M.Sc. (Final) Mathematics Examination

# Numerical Analysis

# Paper - MA/MSCMT-08

**Time : 3 Hours ]**          **[ Max. Marks :- 80**

**Note:** The question paper is divided into three sections A, B and C. Write answers as per the given instructions.

### Section - A      **8 × 2 = 16**
(Very Short Answer Questions)

**Note:** Answer **all** questions. As per the nature of the question delimit your answer in one word, one sentence or maximum up to 30 words. Each question carries 2 marks.

1)    (i)    What do you mean by an iterative method?

     (ii)    Write a method to solve a polynomial equation.

     (iii)  Write two methods to solve system of simultaneous equation.

     (iv)  What do you mean by Eigen value problem?

     (v)    Write formula for Euler method.

     (vi)  What is use of least square method.

(vii) Write any example of IVP (Initial Value Problem).

(viii) What is a Chebystev Polynomial?

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**Section - B**　　　　　$4 \times 8 = 32$

(Short Answer Questions)
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**Note:** Answer **any four** questions. Each answer should not exceed 200 words. Each question carries 8 marks.

2) Find root of $x^3 - 8x - 40 = 0$ by Secant method.

3) Using Newton Raphson method find fifth root of 3 corrected upto 3 decimal places.

4) Find Eigen value and Eigen vectors of

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

5) Solve

$$x + y + z = 3$$
$$2x + 2y + 5z = 9$$
$$2x + y + 2z = 5$$

by Gauss Elimination method

6) Explain power method to find greatest Eigen value of a matrix.

7) Fit a straight line $y = a + bx$ to the following data.

| $x$ | 50 | 60 | 70 | 80 |
|---|---|---|---|---|
| $y$ | 205 | 225 | 248 | 274 |

8) Find value of $y(0.2)$ and $y(0.4)$ from the DE. $\dfrac{dy}{dx} = \dfrac{1}{x+y}$ $y(0) = 2$ by

Runge - Kutta method using h = 0.2.

9) Explain least square principle for continuous function.

**Section - C**                    $2 \times 16 = 32$

(Long Answer Questions)

**Note:** Answer **any two** questions. You have to delimit your each answer maximum up to 500 words. Each question carries 16 marks.

10) Solve

$$x + 5y + \ z = 9$$
$$2x + \ y + 3z = 12$$
$$3x + \ y + 4z = 16$$

by LV decomposition method.

11) Solve BVP $\dfrac{d^2y}{dx^2} = y^2$, $y(0) = 1$ and $y(1.1) = 2$ by Runge Kutta Method.

12) Solve BVP $\dfrac{d^2y}{dx^2} = x^2y$ , $y(0) + y'(0) = 1$ and $y(0) = 1$

13) Use Newton - Raphson method for finding $p^{th}$ root of a number and use it compute the value of $\sqrt{23}$ corrected to 5 decimal place.

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