

**MA/MSCMT-08**

December - Examination 2018

**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. Use of non-programmable scientific calculator is allowed in this paper.

**Section - A** **$8 \times 2 = 16$** 

(Contain eight (08) Very Short Answer Type Questions)

**Note:** Section 'A' contains Very short Answer Type Questions. Examinees have to attempt all questions. Each question is of 02 marks and maximum word limit may be thirty words.

- 1) (i) Write the difference between Regula-falsi method and Secant Method.
- (ii) Define trace of a matrix.
- (iii) Write normal equations for fitting of a parabola  $y = a + bx^2$ .
- (iv) Express  $4x^3 + 2x + 1$  as sum of Chebyshev polynomials.
- (v) Write corrector formula of Milne's Method.
- (vi) Write Chebyshev's formula for finding root of a equation.

(vii) Define Hermitian and Skew-Hermitian matrix.

(viii) Write drawbacks of Picard's method.

**Section - B**

**4 × 8 = 32**

(contain Eight Short Answer Type Questions)

**Note:** Section 'B' contain 08 short Answer Type Questions. Examinees will have to answer any four (4) question. Each question is of 08 marks. Examinees have to delimit each answer in maximum 200 words.

- 2) Find the real root of equation  $x^3 - 2x - 5 = 0$  using Regula-Falsi method.
- 3) Find the root of equation  $x^3 - x^2 - x - 1 = 0$  using Chebyshev method.
- 4) Explain Jacobi method to find Eigen values of matrix.
- 5) Explain Given's method to transform matrix into tri-diagonal form.
- 6) Fit a straight line to the given data, also find value of  $y$  at  $x = 3.5$

X:	-1	0	1	2	3	4	5	6
Y:	10	9	7	5	4	3	0	-1

- 7) Obtain a second degree polynomial approximation to the function

$$f(x) = \frac{1}{1+x^2}, x \in [1, 1.2]$$

Using Taylor series expansion about  $x = 1$ .

- 8) Use Picard's method (2 iterations) to compute  $y(t)$  given that

$$\frac{dy}{dt} = \frac{e^{-1}}{y} \text{ and } y(0) = 2 .$$

- 9) Solve by Miline's method to compute  $y(1.4)$  given  $\frac{dy}{dt} = \frac{t}{y}$ .

t:	1	1.1	1.2	1.3
y:	2	2.052	2.107	2.166

### Section - C

$2 \times 16 = 32$

(Contain 4 Long Answer Type Questions)

**Note:** Section 'C' contains Four Long Answer Type Questions. Examinees will have to answer any two (02) questions. Each question is of 16 marks. Examinees have to answer in maximum 500 words.

- 10) Describe Graeffe's root squaring method to find roots of a equation.
- 11) Explain method of decomposition to solve system of equations and use it to solve

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

$$x + 2y + 3z = 6$$

$$3x + y + 2z = 8$$

- 12) Solve the boundary value problem  $\frac{d^2y}{dt^2} = y$ ,  $y(0) = 0$ ,  $y(1) = 1.1752$  by shooting method together with Runge-Kutta method.

- 13) (i) Solve the boundary value problem

$$\frac{d^2y}{dx^2} = xy, y(0) + y'(0) = 1 \text{ and } y(1) = 1 \text{ with step size } h = \frac{1}{3}.$$

- (ii) Explain least square principle for continuous functions.

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