MA/ MSCMT-08

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

Section - A   **8 × 2 = 16**

(Very Short Answer Questions)

Note: This Section - A contains 8 (eight) very short answer type questions. All questions are compulsory. Each question carries 2 (two) marks and maximum word limit for each answer will be 30 words.

1) (i) Write name of any two iterative methods.

(ii) Write formula for Mullar's method.

(iii) What is an eigen value?

(iv) Write any method to solve system of simultaneous equations.

(v) What do you mean by Curve fitting?

(vi) Write formula for Picard method.

(vii) $\Delta^2(3e^{2x}) = ?$

(viii) Write rate of convergence of bisection method.

<div align="center">

Section - B   **4 × 8 = 32**

(Short Answer Questions)

</div>

Note: This Section - B contains Eight Short Answer Type Questions. Examinees will have to answer any four (04) question. Each question is of 8 marks. Examinees have to delimit each answer in maximum 200 words.

2) Find real root of $x\log_{10}x - 1.2 = 0$ by Newton-Raphson method.

3) Find the root of $f(x) = x + \log x - 2$ using Chebyshev method.

4) Solve : $x + y + z = 8$
$$2x + 3y + 2z = 19$$
$$4x + 2y + 32 = 23$$

by Gauss Jordon method.

5) Find Eigen values of $\begin{bmatrix} 1 & 1 & 1 \\ 2 & 3 & 2 \\ 4 & 2 & 3 \end{bmatrix}$ and find 2 eigen vectors also.

6) Solve $\dfrac{dy}{dx} = x + y$ subject to $y(0) = 1$ by Picard method and hence find $y(0.2)$.

7) Fit an exponential Curve of the form $y(x) = ab^x$ to the following data:

x	2	3	4	5	6
y	144.0	172.8	207.4	248.8	298.5

8) Obtain a second degree polynomial approximation to the function

$f(x) = \dfrac{1}{1 + x + x^2}$, $x \in [1, 1.2]$ using taylor series expansion about $x = 1$

9) Solve following BVP problem by any numerical method.

$\dfrac{dy}{dx} = 1 + x + y$ $\begin{matrix} y(0) = 1 \\ y(1) = 2 \end{matrix}$

<div align="center">

Section - C $2 \times 16 = 32$

(Long Answer Questions)

</div>

Note: Section - C contains 4 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) Explain any method with example to find complex root of any equation.

11) Solve the following system of equation by Gauss Seidal method.

$x + 4y + 15z = 24$
$x + 12y + z = 26$
$10x + y - 2z = 10$

12) Solve BVP $\dfrac{d^2 y}{dx^2} = xy$, $y(0) + y'(0) = 1$ and $y(0) = 1$ with step size $h = \dfrac{1}{3}$

13) Solve $\dfrac{dy}{dx} = 2 + \sqrt{xy}$ with $y(1) = 1$ by Runge-Kutta third order method and find $y(1.2)$

_____