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MA/MSCMT-08

December - Examination 2017

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

Section - A **8 × 2 = 16**

(Very Short Answer Type Questions)

Note: Section 'A' contain 08 Very Short Answer Type Questions. Examinees have to attempt all questions. Each question is of 02 marks and maximum word limit is thirty words.

1) (i) What is the condition for iterative scheme $x_{n+1} = \phi(x_n)$ so that it become convergent.

(ii) Write rate of convergence of the chebyshev method.

(iii) Write normal equations for fitting the curve $y = a + bx^2$

(iv) State minimax property of chebyshev polynomial.

(v) Write Runge-Kuta method of order three.

(vi) Write Miline's corrector formula.

(vii) Write condition for a method to be absolute stable.

(viii) Write difference between Gauss elimination method and Gauss-Jorden method for solving a system of equation.

Section - B $4 \times 8 = 32$

(Short Answer Type Questions)

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

2) Find square root of 10 using Newton Raphson method.

3) Describe Muller's method to find root of a equation.

4) Perform 3 iterations of Birge-Vieta method to find root of equation $x^4 - x - 10 = 0$

5) Explain power series method to find Eigen value of a matrix.

6) Fit a straight line from given data

x	–1	0	1	2	3	4	5	6
y	10	9	7	5	4	3	0	–1

7) Explain Gran-Schmidt Orthogonalizing process.

8) Use Picard's Method to find solution of equation

$\frac{dy}{dx} = \frac{1}{ye^x}$ with $y(0) = 2$

9) Use Adams-Moultan predicator corrector formula to find $y(0.4)$ given

$\frac{dy}{dx} = xy$ with $y(0) = 1, y(0.1) = 1.01, y(0.2) = 1.022, y(0.3) = 1.023$

Section - C

2 × 16 = 32

(Long Answer Questions)

Note: Section 'C' contain 4 Long Answer Type Questions. Examinees will have to answer any two (2) questions. Each question is of 16 marks. Examinees have to delimit each answer in maximum 500 words.

10) Explain method of decomposition and use it to solve :

$2x + 3y + z = 9$

$x + 2y + 3z = 6$

$3x + y + 2z = 8$

11) Use Given's method to find all eigen values and eigen vectors of matrix

$$A = \begin{bmatrix} 4 & 2 & 2 \\ 2 & 5 & 1 \\ 2 & 1 & 6 \end{bmatrix}$$

12) Solve the boundary value problem

$$\frac{d^2y}{dx^2} = \frac{3}{2}y^2$$

$y(0) = 4,\ y(1) = 1$

with step size $h = \frac{1}{3}$ using second order method.

13) Solve the boundary value problem $\frac{d^2y}{dx^2} = y\ \ y(0) = 0,\ y(1) = 1.1752$

by shooting method together with Runge-Kutta Method.

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