7. Compute $y(1.4)$, using fourth order Runge-Kutta method, given that $h = 0.2$ :

$$\frac{dy}{dt} = \frac{t}{y}, \; y(1) = 2$$

8. Evaluate $y(1.5)$ by Adams-Bashfourth method of order four, given that :

$$\frac{dy}{dt} - t^2(1+y)$$

$$y(1.1) = 1.233, \; y(1.2) = 1.548,$$

$$y(1.3) = 1.979, \; y(1.4) = 2.575$$

9. Solve the boundary value problems by a second order finite difference method with step size $h = 0.25$ :

$$\frac{d^2y}{dx^2} + (1+x^2)y + 1 = 0, \; x \in [0,1]$$



# MAMT-08/MSCMT–08

**June – Examination 2022**

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

**MATHEMATICS**

**(Numerical Analysis)**

**Paper : MAMT-08/MSCMT-08**

*Time : 1½ Hours* ] [ *Maximum Marks : **80***

***Note*** :– The question paper is divided into two Sections A and B. Write answers as per the given instructions. Use of non-programmable Scientific Calculator is allowed in this paper.

**Section–A** **4×4=16**

**(Very Short Answer Type Questions)**

***Note*** :– Answer any *four* 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 4 marks.

1. (i) Write error equation for iterative method.

   (ii) Find a real root of the equation $x^3 - 9x + 1 = 0$ by bisection method using two iterations.

   (iii) Define skew-Hermitian matrix and give an example of skew–Hermitian matrix.

   (iv) In Given's method how many plane rotations required to reduce a matrix of order $n$ into tridiagonal form.

   (v) State principle of least square for fitting a curve.

   (vi) Write normal equations for fitting a parabola $y = ax + bx^2$.

   (vii) Define Lanczos economization.

   (viii) Express $2T_0(x) + T_1(x) + 2T_2(x)$ as a polynomial in $x$.

**Section–B** **4×16=64**

**(Short Answer Type Questions)**

***Note*** :– Answer any *four* questions. Each answer should not exceed **200** words. Each question carries 16 marks.

2. Find square root of 13 using Chevyshev method.



3. Find all the roots of the equation $x^3 - 6x^2 + 11x - 6 = 0$ using Graeffe's root squaring method.

4. Using the Gauss-Jordan method solve the following linear equations :

$$10x + y + z = 12$$

$$2x + 10y + z = 13$$

$$x + y + 5z = 7$$

5. Use two iterations of Jacobi method to compute eigenvalues of given matrix :

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

6. Find the value of $y$ at $t = 0.2$ by using seven terms Taylor's series, where $y(t)$ is the solution of the second order initial value problem :

$$\frac{d^2y}{dt^2} = 4 - t + y^2, \quad y(0) = 1, \quad y'(0) = -1$$