

School of Basic and Applied Sciences

Mathematics
ETE - May 2023

Time : 3 Hours

Marks : 50

Sem IV - MSCM402 - Applied Numerical Analysis

Your answer should be specific to the question asked

Draw neat labeled diagrams wherever necessary

1. Round off the numbers 865250 and compute relative error. K2 CO1 (2)
2. Find a root of the equation $x^3 - 2x - 5 = 0$ using Secant method correct to three decimal places upto 2 iteration. K2 CO2 (2)
3. Compute two iterations of the power method to approximate a largest eigenvector of K3 CO3 (2)

$$A = \begin{bmatrix} 2 & -12 \\ 1 & -5 \end{bmatrix}$$

4. What do you mean by interpolation and also write Lagrange's interpolation formula. K3 CO4 (2)
5. Write Milne's predictor- corrector formula. K4 CO5 (2)
6. Find the absolute error and relative error in $\sqrt{6} + \sqrt{7} + \sqrt{8}$ correct to 4 significant digits. K3 CO1 (5)

7. K4 CO2 (5)

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

Transform the matrix to tridiagonal form by Given's method .

8. Consider $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5, t \geq 0$ given that $u(x, 0) = 20, u(0, t) = 0, u(5, t) = 100$. K6 CO6 (6)
Compute u for the time step with $h = 1$ by Crank -Nicolson method.

9. Find the value of $\cos(1.74)$ from the following table : K4 CO3 (8)

x	1.7	1.74	1.78	1.82	1.86
Sin(x)	0.9916	0.9857	0.9781	0.9691	0.9584

10. K4 CO4 (8)

Given $2 \frac{dy}{dx} = (1 + x^2)y^2 : y(0) = 1, y(0.1) = 1.06, y(0.2) = 1.12, y(0.3) = 1.21$. evaluate $y(0.4)$ by Milne's predictor corrector method.

11. Solve the equation $u_{xx} + u_{yy} = 0$ for the square mesh with boundary values as shown in following figure K5 CO5 (8)

