

Mid-West University
Examinations Management Office

End Semester Examinations 2081

Bachelor level/ B.E. Computer/ 3rd Semester

Full Marks: 50

Time: 3 hours

Pass Marks: 25

Subject: Numerical Methods (SH431/SH506)

- Attempt all the questions
- Figures in the margin indicate full marks.
- Assume suitable values, with a stipulation, if necessary.
- Candidates are required to answer the questions in their own words as far as possible.

1. a) Define trial and error method with suitable examples. [3]
 b) Find the real root of the equation $\sin x + \cos x + e^x = 8$ correct up to 3 decimal places, using bisection method. [3]
 c) Using newton raphson method, compute root of $\cos x + 1.3x = 3$ correct upto 5 decimal places. [4]
2. a) Using LU decomposition method, solve the following set of equations [4]
 $6x + 4y + 7z = 32, 4x + 6y + z = 40, 3x + 4y - z = 56$
 b) Find the largest eigenvalue and corresponding eigen vector of the following matrix using power method. [4]

$$\begin{bmatrix} 4 & -2 & 0 \\ -2 & 4 & -2 \\ 0 & -2 & 4 \end{bmatrix}$$
3. a) From the following set of data, fit $y = ax^2 + bx + c$ [4]

x	1	2	2.5	3	3.5	4
f(x)	1.1	1.4	2	2.6	3.4	4.2

 b) Fit the following set of data into cubic splines to find $y(3.2)$. [4]

x	2	4	6	8	10
y	5.13	8.39	10.9	7.82	13.78
4. Using trapezoidal rule, evaluate $\int_0^2 e^{x^2} dx$ taking $n = 8$. [4]
5. a) Find $y(0.2)$ for $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = e^x$, with step length 0.1 using Runge-Kutta-4 method where $y(0) = 1$ and $y'(0) = 2$. [5]
 b) Solve $dy/dx = 1 + xy$ with $y(0) = 0$ by Picard's method, upto third approximation. [4]
6. Solve the Poisson's equation $\nabla^2 f = -10(x^2 + y^2 + 10)$ over the square domain $x = y = 0$ and $x = y = 3$ with $f = 0$ on the boundary and $h = 1$. [4]
7. What is Laplacian equation? Explain in detail. [7]

The End