Mid-West University

Examinations Management Office

End-Semester Examinations -2080

Bachelor level/ B.E. Civil /4th Semester
Time: 3 hours
Subject: Numerical Methods (SH302/CO441)

Full Marks: 50
Pass Marks: 25

- 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. Define accuracy. Discuss various types of errors in numerical methods with example? [1+3]

2. a) Find the root of the equation $\cos x = xe^x$ using bisection method correct to 3 decimal places. [4]

    b) Use Newton Raphson method to compute the root of $x\log_{10}x = 1.2$ correct up to 3 decimal places. [3]

3. a) Using gauss elimination method with complete pivoting, solve the following set of equations [4]
    $2x - y + 3z = 9, x + y + z = 6$ and $x - y + z = 2$

    b) Obtain by power method, the numerically dominant eigenvalue and corresponding eigenvector of the [4]
    matrix.
    $$\begin{bmatrix} 15 & -4 & -3 \\ -10 & 12 & -6 \\ -20 & 4 & -2 \end{bmatrix}$$

4. a) From the following data, find the number of persons having income between 10 and 15. [4]

Income	0 - 10	10 - 20	20 - 30	30 - 40
No. of persons	9	30	35	42

    b) Find the cubic splines from the following table of values. [4]

x	1	2	3
y	4	12	1

5. a) Evaluate $\int_0^5 (e^x \cos(3x)dx$ using Simpson's 3/8 rule. [4]

    b) Using 3-point Gaussian rule, compute $\int_{0.2}^{2.6} e^{-x}dx$ [4]

6. Given $d^2y/dx^2 - x\, dy/dx + 3\, yz = 2$, $y(0) = 1$ and $y^{l}(0) = 1$. Evaluate $y(0.2)$ using RK method of order [5]
    4 with step size of 0.1.

7. Solve the Poisson's equation $\nabla^2 f = xy^3$ over the domain $2 \le x \le 5$ and $0 \le y \le 3$ with $f = 0$ on the [4]
    boundary.

8. Write down algorithm, flowchart and code for composite trapezoidal method. [6]

THE END