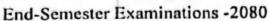
## Mid-West University

## **Examinations Management Office**



Bachelor level/ B.E. Civil /4th Semester

Time: 3 hours

Subject: Numerical Methods (SH302/CO441)

Full Marks: 50 Pass Marks: 25

[1+3

[4]

[3]

[4]

[4]

[4]

[4]

[4]

[4]

[6]

- 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.
- Define accuracy. Discuss various types of errors in numerical methods with example?
- 2. a) Find the root of the equation  $\cos x = xe^x$  using bisection method correct to 3 decimal places.
  - b) Use Newton Raphson method to compute the root of xlog<sub>10</sub>x = 1.2 correct up to 3 decimal places.
- 3. a) Using gauss elimination method with complete pivoting, solve the following set of equations 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 matrix.

15	4	-3]
-10		-3 -6 -2
-20	4	-2

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

rom the lollowi	ng data, mid	the hamber of pe	1 1100 20	30 - 40
Income	0 - 10	10 - 20	/ 20 - 30	
400-20-20-20-20-20-20-20-20-20-20-20-20-2	0	30	35	42
No. of persons	7	130	17	

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

x	1	2	3
у	4	12	1

- 5. a) Evaluate  $\int_0^5 (e^x \cos(3x) dx$  using Simpson's 3/8 rule.
  - b) Using 3-point Gaussian rule, compute  $\int_{0.2}^{2.6} e^{-x} dx$
- 6. Given  $d^2y/dx^2 x dy/dx + 3 yz = 2$ , y(0) = 1 and y(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 boundary.
- 8. Write down algorithm, flowchart and code for composite trapezoidal method.

THE END