

Code No: D5110

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012

APPLIED NUMERICAL METHODS

(CHEMICAL ENGINEERING)

Time: 3hours

Max. Marks: 60

Answer any five questions
All questions carry equal marks

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1. Solve the following by LU decomposition

$$x + 2y + z - 2w = 6$$

$$2x + 3y + 2z - 2w = 8$$

$$3x + y + 2z - w = 4$$

$$3x + 2y + 2z - 3w = 9$$

2. Solve the following equations by Gauss seidel method

$$7x + y + 4z = 5$$

$$2x + 3y + 8z = 9$$

$$x + 8y + 4z = 2$$

3. Find the largest eigen value of
- $A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$
- by power method.

4. Find the eigen values and the corresponding eigen vectors of

$$\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$$

- 5.a) The amount A of a substance remaining in a reaction system after an interval of time t in a certain chemical experiment is given by the following data.

Find value of A at t = 11.

t	2	5	8	14
A	94.8	87.9	813	68.7

- b) Find f(7.5) from the following table using Newton's backward formula.

x	1	2	3	4	5	6	7	8
f(x)	1	8	27	64	125	216	343	512

6. Find y (0.08) using Adam's predictor corrector method given that,

$$\frac{dy}{dx} = 2e^x - y, y(0) = 2$$

by solving for initial values y(0.1), y(0.2), y(0.3) by Runge Kutta method by taking h = .1

7. Solve by Galerkin method $\frac{d^2y}{dx^2} + y = 0$, $y(0) = 0$, $y'(0) = 1$.
8. Solve $y'' = x - y$, $y(0) = 1$, $y(\frac{\pi}{2}) = 2$ by taking $h = \frac{\pi}{8}$, by shooting method, given that initial guesses for $y_1'(0)$ and $y_2'(0)$ are 1 and 2.
