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Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(CTM) (Sem.-1)
COMPUTATIONAL TECHNIQUES
Subject Code : CT-503
Paper ID : [E0803]

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.
3. Assume data suitably if not given.

1. a) Find a root of the following equations using the bisection method correct to two decimal places : (7)

(i) $x^3 - 5x + 1 = 0$ (Root lies between 2 & 3)

(ii) $x^3 - x - 11 = 0$ (Root lies between 2 & 3)

- b) Find cube root of 41, using Newton-Raphson method. (7)

- c) Find negative root of the equation $x^3 - 9x^2 + 18 = 0$ correct to two decimal places by Horner's method. (6)

2. Solve the following equation by the Gauss-Elimination Method: (20)

$$10x - 7y + 3z + 5\mu = 6$$

$$-6x + 8y - z - 4\mu = 5$$

$$3x + y + 4z + 11\mu = 2$$

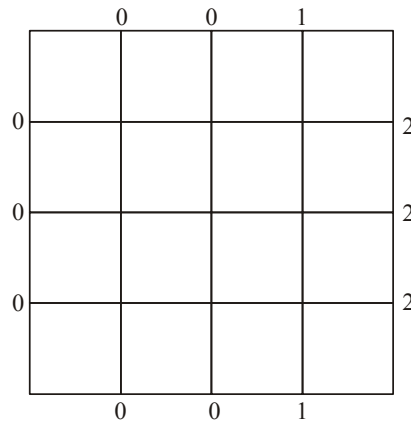
$$5x - 9y - 2z + 4\mu = 7.$$

3. Find the largest Eigen Value and the corresponding Eigen vector of the matrices :

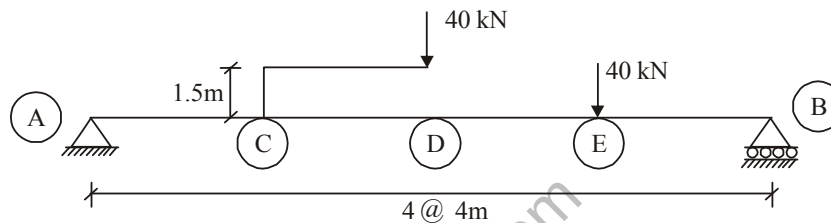
a)
$$\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$
 (10)

b)
$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & -4 & 2 \\ 0 & 0 & 7 \end{bmatrix}.$$
 (10)

4. Solve the elliptic equation $U_{XX} + U_{YY} = 0$ for the square mesh with boundary values as shown in figure. Iterate till the maximum difference between successive values at any point is less than 0.005. (20)



5. Compute moment ordinates for the beam loaded as under by numerical procedure. (20)



6. a) Find a second degree parabola for the following set of points : (16)

X	1	2	3	4	5	6	7	8	9	10
Y	2	7	8	10	11	11	10	10	9	8

- b) Define standard error of estimate. (4)

7. For a trial family of solution as

$$x = 1 + c_1 t + c_2 t^2$$

with $x = 1, t = 0$

$$\frac{dx}{dt} = -x, t > 0, \text{ evaluate the parameters by applying}$$

- (a) Collocation points method (7)
(b) Galerkin method (7)
(c) Least square method. (6)

8. Write short note on :

- (a) Explicit solution of non-linear problems. (10)
(b) Coefficient of correlation. (10)