Code: 9D12103

M.Tech I Semester Regular & Supplementary Examinations January/February 2017

NUMERICAL METHODS

(Geotechnical Engineering)

Time: 3 hours Max. Marks: 60

Answer any FIVE questions

All questions carry equal marks

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1 Using Picard's, obtain second degree approximation to the solution.

$\frac{d^2y}{dx^2} = x^3\frac{dy}{dx} + x^3y \; with \; y(0) = 1, y'(0) = \frac{1}{2}$.

2 Solve the system of equation using Gauss elimination method.

$$\begin{bmatrix} 2 & 1 & 1 & -2 \\ 4 & 0 & 2 & 1 \\ 3 & 2 & 2 & 0 \\ 1 & 3 & 2 & -1 \end{bmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{pmatrix} = \begin{bmatrix} -10 \\ 8 \\ 7 \\ -5 \end{bmatrix}$$

3 (a) State Lagrange's interpolation method and use it to find the value of y at x = 6 from the following data.

X:	3	7	9	10
Y:	168	120	72	63

(b) Explain interpolation by central difference method.

4 (a) Taking E as fundamental operator, prove $\Delta = E - 1$.

(b) Explain Lagrange's method of inverse interpolation.

5 Find the cubic polynomial which takes the following values:

x:	0	1	2	3
f(x)	1	2	1	10

hence evaluate f(4)

6 (a) Explain displacement approach for finite element analysis based on piecewise approximation.

(b) Write the steps to solve a 2D problem by using finite element method.

7 Explain finite element technique using minimization of total potential energy principle.

8 Write short notes on:

(a) Stability analysis of sheet piles.

(b) Positions of anchorage for sheet piles.

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