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Code: 9D12103

M.Tech I Semester Regular & Supplementary Examinations February 2016

NUMERICAL METHODS

(Geotechnical Engineering)

(For students admitted in 2011, 2012, 2013, 2014 & 2015 only)

Time: 3 hours Max Marks: 60

Answer any FIVE questions

All questions carry equal marks

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1 (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.

2 Find $\frac{dy}{dx}$ & $\frac{d^2y}{dx^2}$ at $x = 53$ from the following data using Newton's forward difference.

x	50	60	70	80	90
y	19.96	36.65	58.81	77.21	94.61

3 Using Taylor's series method, find the values of x and y for $t = 0.4$ satisfying equations: $\frac{dx}{dt} = x + y + t$, $\frac{d^2y}{dt^2} = x - t$, with initial condition $= 0, y = 0, \frac{dy}{dt} = -1$ at $t = 0$.

4 (a) Solve the equations:

$x_1 + 2x_2 + x_3 = 2$

$3x_1 + 6x_2 + x_3 = 1$

$3x_1 + 3x_2 + 2x_3 = 1$

(i) Using Cramer's rule.

(ii) Determining the inverse of the coefficient matrix.

(b) What is pivoting in Gauss elimination method?

5 (a) Solve $2x + y = 3, 2x + 3y = 5$ by Gauss Seidel iteration method.

(b) Solve by Jacobi's method:

$5x - y + z = 10$

$2x + 4y = 12$

$x + y + 5z = -1$ with initial values (2, 3, 0).

6 (a) What are the advantages and disadvantages of FEM over conventional methods?

(b) Write down analysis steps for 2D element by using FEM.

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

8 Write short notes on:

(a) Types of sheet pile walls.

(b) Stability analysis of sheet piles.

(c) Failure measurement of sheet piles.

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