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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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State Lagrange's interpolation method and use it to find the value of y at x = 6 from the following data. 1 (a)

х	3	7	9	10
У	168	120	72	63

Explain interpolation by central difference method. (b)

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

	x	50	60	70	80	90
	у	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. anker.co
- (a) Solve the equations: 4
  - $x_1 + 2x_2 + x_3 = 2$  $3x_1 + 6x_2 + x_3 = 1$
  - $3x_1 + 3x_2 + 2x_3 = 1$
  - (i) Using Cramer's rule.
  - (ii) Determining the inverse of the coefficient matrix.
  - (b) What is pivoting in Gauss elimination method?
- Solve 2x + y = 3, 2x + 3y =5 by Gauss Seidel iteration method. 5 (a)

(b) Solve by Jacobi's method: 5x - y + z = 102x + 4y = 12x + y + 5z = -1 with initial values (2, 3, 0).

- 6 (a) What are the advantages and disadvantages of FEM over conventional methods?
  - Write down analysis steps for 2D element by using FEM. (b)
- Explain finite element technique using minimization of total potential energy principle. 7
- 8 Write short notes on:
  - Types of sheet pile walls. (a)
  - (b) Stability analysis of sheet piles.
  - Failure measurement of sheet piles. (C)

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