

7E7065	Roll No. _____	[Total No. of Pages : 3]
	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">7E7065</div> B.Tech. VII Semester (Main) Examination, Dec. - 2015 Civil Engg. 7CE5A Application of Numerical Methods in Civil Engg.	

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) i) Explain the various types of errors with suitable examples. (4)
- ii) Convert $(0.859375)_{10}$ to the corresponding Binary Fraction (4)
- b) If $n = 10x^3y^2z^3$ and error in x, y, z are respectively 0.03, 0.01 & 0.02 at $x = 3, y = 1$ & $z = 2$, calculate the absolute error & percent relative error in the calculation of it. (8)

OR

1. Explain the Taylor's Theorem and derive General formula for errors using the Taylor's theorem. (16)

Unit - II

2. Find the root of the equation, $\cos x - xe^x = 0$ using secant method correct to four decimal places. (16)

OR

2. Using Newton - Raphson method, find a root of the equation $f(x) = x \sin x + \cos x = 0$ correct to three decimal places, assuming that the root is near to $x = \pi$. (16)

Unit - III

3. Solve the equations , by using cramer's

Rule

$$x_1 + 2x_2 - x_3 = 2$$

$$3x_1 + 6x_2 + x_3 = 1$$

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

(16)

OR

3. Solve the system of equations.

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 8 & 22 \\ 3 & 22 & 82 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \\ -10 \end{bmatrix}$$

(16)

Unit - IV

4. Starting with $(x_0, y_0, z_0) = (0, 0, 0)$ as first iteration, calculate the Next three iteration for the solution of the system of equation as given below.

$$5x - y + z = 10$$

$$2x + 8y - z = 11$$

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

(16)

OR

4. Solve $54x + y + z = 110$
 $2x + 15y + 6z = 72$
 $-x + 6y + 27z = 85$

Using Gauss - seidel method.

(16)

Unit - V

5. Find the cubic polynomial $f(x)$ which takes on the values $f(0) = -4, f(1) = -1, f(2) = 2, f(3) = 11, f(4) = 32, f(5) = 71$, Hence, or otherwise obtain the value of $f(6)$ (16)

OR

5. The following values of the Function $F(x) = \sin x + \cos x$ are given as (16)

x	10°	20°	30°
$f(x)$	1.1585	1.2817	1.3660

Construct the quadratic interpolating polynomial that fit the data, find $f(\pi/12)$
Compare with exact value.