

<b>3E2014</b>	Roll No. : _____	Total Printed Pages : <span style="border: 1px solid black; padding: 2px;">4</span>
<div style="border: 1px solid black; padding: 5px; display: inline-block; margin: 5px;"><b>3E2014</b></div>		
<b>B. Tech. (Sem. III) (Main &amp; Back) Examination, January - 2013</b> <b>Civil Engg.</b> <b>3CE4 Computer Application in Civil Engg.</b>		

Time : 3 Hours]

 [Total Marks : 80  
 [Min. Passing Marks : 24

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.

Use of following supporting material is permitted during examination.  
 (Mentioned in form No. 205)

1. NIL2. NIL**UNIT - I**

- 1 (a) What is error ? Explain absolute and relative error in detail also explain the meaning of approximations and round of errors in detail.

12

- (b) Write short note on truncation errors.

4

**OR**

- 1 (a) If we want to approximate  $e^{10.5}$  with an error less than  $10^{-12}$  using the Taylor series for  $f(x) = e^x$  at 10, at least how many terms are needed.

8

- (b) Explain how truncation errors can be estimated by geometry series.

8



## UNIT - II

2 Solve the system of equations

$$3x_1 - 2x_2 + 3x_3 = 4$$

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

$$2x_1 + 4x_2 + 10x_3 = 2$$

Iterate two times using the Gauss-Seidel method, stating with the initial approximations as  $x_1 = 0.3$ ,  $x_2 = -0.8$  and  $x_3 = 0.3$ .

16

OR

2 (a) Explain successive substitution method with its derivation and algorithm.

8

(b) Derive formula for decomposition methods also write down its algorithm.

8

## UNIT - III

3 (a) Fit a second degree parabola to the following data :

x:	1.0	2.0	3.0	4.0	5.0	6.0	7.0
y:	1.1	1.6	2.7	4.1	5.8	6.9	8.2

8

(b) Explain various applications of difference relations in the solution of differential equations with an example.

8

OR

3 (a) Given data is

A	1.0	1.1	1.2	1.3	1.4	1.5	1.6
B	7.989	8.403	8.781	9.129	9.451	9.750	10.031

find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at  $x = 1.6$ .

11



(b) Write short note on non-linear Regression analysis.

5

### UNIT - IV

4 (a) Write an algorithm for Simpson's  $\frac{3}{8}$  rule for a known function.

8

(b) State the assumptions made and derive the expression for numerical integration using Simpson  $\frac{3}{8}$  rule.

8

OR

4 Evaluate  $\int_0^6 \frac{dx}{1+x}$  by using Newton's method for integration.

Trapezoidal method, Simpson  $\frac{1}{3}$  method and Simpson  $\frac{3}{8}$  method.

16

### UNIT - V.

5 (a) Give Algorithm and explain Range-Kutta fourth order method for solution of differential equation of first order and first degree.

8

(b) Derive equations for Numerical solution of ordinary differential equations by Euler method.

8

OR



- 5 (a) Derive an equation of ordinary differential equation by predictor - corrector method with its Algorithm. 8

- (b) Apply Predictor corrector method to find  $y(0.6)$  for differential equation

$$\frac{dy}{dx} = x - y^2, \text{ given } y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795. \quad 8$$

