G 1054 (Pages : 2) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, MAY 2014

**Eighth Semester**

Branch : Civil Engineering

CE 010 805 G05 – NUMERICAL METHODS (Elective IV) [CE]

(New Scheme–2010 Admissions)

[Regular]



Time : Three Hours Maximum : 100 Marks

## Part A

*Answer* **all** *questions.*

*Each question carries* 3 *marks.*

1. Explain Cholesky method.
2. Briefly describe Jacobi's method.
3. Explain isoparametric style of interpolation.
4. Describe weighted residual method.
5. Explain the method of least squares.

(5 × 3 = 15 marks)

## Part B

*Answer* **all** *questions.*

*Each question carries* 5 *marks.*

6. Explain Gaussian elimination.
7. What is meant by Eigenvalue problem? Explain eigenvalues and eigenvectors.
8. Explain trapezoidal rule and Gaussian quadrature formula.
9. Explain finite difference method.
10. What do you mean by frequency chart?

(5 × 5 = 25 marks)

## Part C

*Answer* **all** *questions.*

*Each full question carries* 12 *marks.*

11. Use Gauss elimination method to solve $10x - 7y + 3z + 5u = 6$, $-6x + 8y - z - 4u = 5$, $3x + y + 4z + 11u = 2$ and $5x - 9y - 2z + 4u = 7$.

*Or*

**Turn over**

12. Discuss the advantages of submatrix equation solver.

13. Find the eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.

*Or*

14. Using Jacobi's method, find the eigenvalues and eigen vectors of the matrix :

$$\begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$

15. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (i) Trapezoidal rule and (ii) Simpson's $\frac{3}{8}$ rule.



*Or*

16. Use Simpson's $\frac{1}{3}^{rd}$ rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.

17. Find Newton's forward difference interpolating polynomial for the following data :

| $x$ | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 |
|---|---|---|---|---|---|
| $y = f(x)$ | 1.4 | 1.56 | 1.76 | 2 | 2.28 |

*Or*

18. Obtain a cubic backward interpolation polynomial for the table of points given. Find the value of $y$ at $x = 2.2$ :

| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Y | 2.105 | 2.808 | 3.614 | 4.604 | 5.857 | 7.451 | 9.467 | 11.958 |

19. Obtain the Coefficient of correlation from the following data :

| $x$ | 104 | 111 | 104 | 114 | 118 | 117 | 105 | 108 | 106 | 100 | 104 | 105 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $y$ | 57 | 55 | 47 | 45 | 45 | 50 | 64 | 63 | 66 | 62 | 62 | 61 |

*Or*

20. The voltage $v$ across a capacitor at rime $t$ seconds is given by the following table. Use the method of least squares to fit a curve of the form $v = ae^{kt}$ to this data :

| $t$ | 0 | 2 | 4 | 6 | 8 |
|---|---|---|---|---|---|
| $v$ | 150 | 63 | 28 | 12 | 5.6 |

(5 × 12 = 60 marks)