

G 1702

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Reg. No.....

Name.....



**B.TECH. DEGREE EXAMINATION, MAY 2015**

**Eighth Semester**

Branch : Civil Engineering

CE 010 805 G05—NUMERICAL METHODS (Elective IV) (CE)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.  
Each question carries 3 marks.*

1. What is Cholesky method ?
2. Determine the largest eigen value and corresponding eigen vector of the matrix  $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$ .
3. What is Gauss quadrature formula ?
4. What are the finite difference techniques ?
5. Define statistical computations.

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.  
Each question carries 5 marks.*

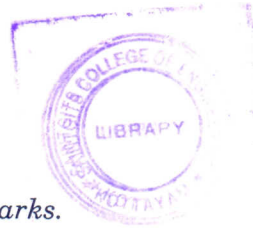
6. Write short notes on storage schemes.
7. Find the dominant eigen value and corresponding eigen vector of the matrix  $A = \begin{pmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$ .
8. State and prove Simpson 3/8 rule.
9. Using Newton's method to find the real root of  $3x - \cos x - 1 = 0$ .
10. Find a solution to  $\begin{bmatrix} -1 & 2 \\ 2 & -3 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 4 \\ 1 \\ 2 \end{bmatrix}$ .

(5 × 5 = 25 marks)

Turn over

## Part C

Answer all questions.  
Each question carries 12 marks.



11. For  $A = \begin{Bmatrix} 16 & 4 & 4 & -4 \\ 4 & 10 & 4 & 2 \\ 4 & 4 & 6 & -2 \\ -4 & 2 & -2 & 4 \end{Bmatrix}$  and  $B = \begin{Bmatrix} 32 \\ 26 \\ 20 \\ -6 \end{Bmatrix}$  and construct Cholesky method to solve  $Ax = B$ .

Or

12. Apply Gauss-Jordan method to find the solution of the system

$$10x + y + z = 12, \quad 2x + 10y + z = 13, \quad x + y + 5z = 7.$$

13. Find the largest eigen value and eigen vector of the matrix by power method  $\begin{bmatrix} 1 & 2 & 3 \\ 0 & -4 & 2 \\ 0 & 0 & 7 \end{bmatrix}$ .

Or

14. Solve by Jacobi's iteration method correct to two decimal places

$$10x + y - z = 11.19, \quad x + 10y + z = 28.08, \quad -x + y + 10z = 35.61.$$

15. Compute  $f(0.3)$  for the data using Lagrange's interpolation formula (Analytic value is 1.831)

$x$	0	1	3	4	7
$f$	1	3	49	129	813

Or

16. Numerically approximate the integral  $\int_0^2 (2 + \cos(2\sqrt{x})) dx$  by using the Trapezoidal rule with  $m = 50, 100, 200, 400$  and  $800$  subintervals.

17. Consider the function  $f(x) = \cos x - x = 0$ . Approximate a root of  $f$  using Newton's method.

Or

18. Solve the differential equation by Galerkin method  $d^2 u/dx^2 + 1 = 0, 0 \leq X \leq 1$ .

$$\left. \begin{array}{l} u(0) = 0, \\ du/dx(1) = 1 \end{array} \right\} \text{ boundary condition.}$$

19. Find the Simple/Linear Regression of :

X	60	61	62	63	65
Y	3.1	3.6	3.8	4	4.1

Or

20. Explain in detail about method of least square curve fitting procedures.

(5 × 12 = 60 marks)