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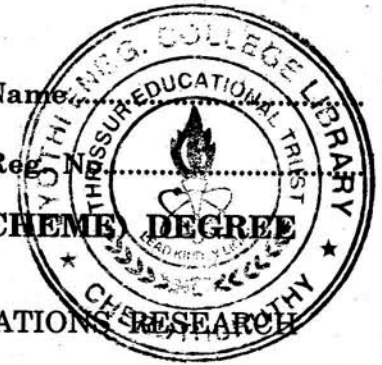
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Name

Reg. No.

**SIXTH SEMESTER B.TECH. [ENGINEERING] (09 SCHEME) DEGREE  
EXAMINATION, APRIL 2015**

**CE/PTCE 09 L04—COMPUTER APPLICATIONS AND OPERATIONS RESEARCH**



Time : Three Hours

Maximum : 70 Marks

**Part A**

*Answer all questions.*

1. Give some criterion for termination of bisection method.
2. Given  $f(2) = 9$ , and  $f(6) = 17$ . Find an approximate value for  $f(5)$  by the method of Lagrange's interpolation.
3. State the algorithms of Simpson's 1/3 rule.
4. State the examples of eigen vectors in structural engineering problems.
5. Discuss the ways to generate the dual for a linear programming problem.

(5 × 2 = 10 marks)

**Part B**

*Answer any four questions.*

6. Using Regula-Falsi method, find a real root of the equation,  $f(x) = x^3 + x - 1 = 0$ , near  $x = 1$ .
7. Find  $\ln 9.2$  with  $n = 3$ , using Lagrange's interpolation formula with the given table :

X	9.0	9.5	10.0	11.0
$\ln x$	2.197	2.251	2.302	2.397

8. Use the Trapezoidal rule with  $n = 4$  to estimate  $\int_1^2 \frac{1}{x} dx$ . Compare the estimate with the exact value of the integral.
9. If 0.333 is the approximate value of  $1/3$ , find the absolute, relative and percentage errors.
10. Calculate the integral value of following function from  $x = 0$  to  $x = 1.6$  using Simpson's 1/3 rule.
11. Distinguish linear programming and non-linear programming problem with respect to Civil Engineering aspect.

(4 × 5 = 20 marks)

Turn over

## Part C

Answer any four questions.

12. Solve by Jacobi's iteration method, the system of equations

$$20x_1 + x_2 - 7x_3 = 17$$

$$3x_1 + 20x_2 - x_3 = -18$$

$$2x_1 - 3x_2 + 20x_3 = 25.$$

Or

13. Apply Gauss elimination method to solve the equations :

$$x + 4y - z = -5$$

$$x + y - 6z = -12$$

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

14. Find the eigen values and the corresponding eigen vectors of the matrix

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}.$$

Or

15. From the following table, find the value of
- $e^{1.17}$
- using Gauss' forward formula.

X	1.00	1.05	1.10	1.15	1.20	1.25	1.30
$e^x$	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

16. Find an approximate value of
- $\log_e 5$
- by calculating
- $\int_0^5 \frac{dx}{4x+5}$
- , by Simpson's 1/3 rule of integration.

Or

17. Construct the forward difference table, where
- $f(x) = 1/x$
- ,
- $x=1(0.2)2, 4D$
- .

18. Use the Simplex algorithm.

$$\begin{aligned} \text{Maximize } Z &= 4x_1 - x_2 + 2x_3 \\ \text{subject to } 2x_1 + x_2 + 2x_3 &\leq 6 \\ x_1 - 4x_2 + 2x_3 &\leq 0 \\ 5x_1 - 2x_2 - 2x_3 &\leq 4 \\ x_1, x_2, x_3 &\geq 0. \end{aligned}$$

Or

19. Solve the following LPP graphically maximum and minimize  $Z = 3x + 5y$ .

subject to constraints

$$\begin{aligned} 3x - 4y + 12 &\geq 0 \\ 2x - y + 2 &\geq 0 \\ 2x + 3y - 12 &\geq 0. \end{aligned}$$

(4 × 10 = 40 marks)