Subject Code-: C9517

M.Tech - I Semester [R09] Regular/Supplementary Examinations, April - 2012

COMPUTATION TECHNIQUES and OPTIMIZATION

(Control Systems)

Time: 3 Hours | Max Marks: 60

Answer any FIVE questions. All questions carry EQUAL marks.

1. a. Find the root of the equation $x^3 - x - 11 = 0$, correct to 4 decimals using bisection method

   b. Solve the system of equations

$$3x_1 - 6x_2 - 3x_3 = -3$$
$$2x_1 + 6x_3 = -22$$
$$-4x_1 + 7x_2 + 4x_3 = 3$$

   by using L U decompostion method?

2 a. Use Lagrange's interpolation formula, find the values of y when x =10, from the following table

x:	5	6	9	11
y:	12	13	14	16

   b. Find the curve of best fit of the type $y = ae^{bx}$ to the following data by method of least squares

x:	1	5	7	9	12
y:	10	15	12	15	21

3 Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using (i) simpson's $\frac{1}{3}$ rule taking h $= \frac{1}{4}$

(ii) simpson's $\frac{3}{8}$ rule taking h $= \frac{1}{6}$

4 a. Use Milne's predictor corrector method to obtain the solution of the equation $\frac{dy}{dx} = x - y^2$ at x =0.8, given that y(0) = 0.0000, y(0.2) = 0.0200, y(0.4) = 0.0795, y(0.6) = 0.1762

   b. Use Runge-Kutta method to find y when x = 1.2 n steps of 0.1 given that $\frac{dy}{dx} = x^2 + y^2$ and y(1) = 1.5

5 Solve the following problem by simplex method

$$Maxmize\ Z = x_1 - x_2 + 3x_3$$

Subject to

$$x_1 + x_2 + x_3 \leq 10$$
$$2x_1 - x_3 \leq 2$$
$$2x_1 - 2x_2 + 3x_3 \leq 10$$

$$x_1, x_2, x_3 \geq 0$$

6 Show that the function $f(x) = x_2,\ 0 \leq x \leq 1, f(x) = 2 - x, 0 \leq x \leq 1,$ is unimodel in (0, 2). Use the Fibonacci method to find its maximal point with in an interval of uncertainity 0.1

7 Solve

$$Maxmize\ Z = 3X_1^{\ 2} + 14X_1X_2 - 8X_2^2$$

Subject to

$$3X_1 + 6X_2 \leq 72$$

$$X_1,\ X_2 \geq 0$$

by using Kuhn – Tucker conditions?

8 a. Distinguish between CPM and PERT

b. Define the following

(i) Total float

(ii) Free float

(iii) Critical path

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