(19) SE-sem-IV- CBGS- Electrical. 22/12/15

NMOT

QP Code : 5517

(3 Hours) [Total Marks: 80

N.B.:

- Question No. 1 is compulsory.
- Answer any **three** from the remaining five questions.
- Assume suitable data if necessary and justify the same.
- Figures to the right indicate the marks.

1 Each question carry 5 marks 20

a Define the following:

(i) True error and Approximate error

(ii) Absolute error and Relative error

b Write the algorithm for computing a simple root of an equation f(x)=0 using bisection method.

c Write the formula to calculate error in interpolation. Write any one method to reduce it.

d Compare Picard's method with Runga Kutta method for solving a differential equation.

2 a Give the algorithm for secant Method. Find the root of cos(x)=3x-1 using secant method with initial guesses of $x_{i-1} = 1$ and $x_i=2$ and iterate till the relative error is less than 0.5%. 10

b Solve the following system of equations using LU decomposition. 10

$3x_1 - 0.1\, x_2 - 0.2x_3 = 7.85$

$0.1x_1 + 7\, x_2 - 0.3x_3 = -19.3$

$0.3x_1 - 0.2\, x_2 + 10x_3 = 71.4$

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3 a What is meant by curve fitting with sinusoidal function? Find a sinusoidal function that fits the temperature of a city for 6 months with the following data. Use this data to find the mean, amplitude and time of maximum temperature.

Month	1	2	3	4	5	6
Temperature	21°c	6°c	10°c	28°c	44°c	40°c

b Solve the following NLPP using Kuhn Tucker Method 10

$$Max\ Z = 10x_1 + 10x_2 - x_1^2 - x_2^2$$
$$subjected\ to\ \ x_1 + x_2 \le 8,\ \ -x_1 + x_2 \le 5,\ \ x_1, x_2 \ge 0$$

4 a Solve the following differential equations using fourth order Runga Kutta method for t=1 Given the initial condition when t=0 as, y(0)=1, z(0)=2 and step size h=1. 10

$$\frac{dy}{dt} = z;\ \ \frac{dz}{dt} = -z + \sin(ty);$$

b What do you understand by extrapolation and interpolation? What are the various methods for interpolation? Using Newton's Divided difference method of order '3' find 'y' at x =2.5 from the following data with maximum accuracy. 10

x	0	1.5	2	3	3.5
y	1	-1.625	-1	7	15.875

5 a What are the necessary conditions for solving multivariable optimization using Lagrange's Multiplier. Solve the following optimization problem using Lagrange's Multiplier. 10

$$Optimize\ Z = 7x_1 - 0.3x_1^2 + 8x_2 - 0.4x_2^2$$
$$subjected\ to\ \ 4x_1 + 5x_2 = 100,\ \ \ x_1, x_2 \ge 0.$$

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b Define Feasible solution and Optimal feasible solution. 10

Solve the following LPP and identify the Feasible & Optimal feasible region graphically.

$$Max\ Z = 40x_1 + 50x_2$$
$$subjected\ to\ 3x_1 + x_2 \le 9$$
$$x_1 + 2x_2 \le 8$$
$$x_1, x_2 \ge 0$$

6 a Solve the following LP problem using simplex method. 10

$$Min\ Z = -3x_1 - 2x_2$$
$$subjected\ to\ x_1 - x_2 \le 1$$
$$-3x_1 + 2x_2 \ge -6$$
$$x_1, x_2 \ge 0$$

b Explain what is meant by multi step method to solve differential equation? What is the advantage of this method over single step method? Use Adam Bashforth's method to solve $\frac{dy}{dx} = 4e^{0.8x} - 0.5y$ in the interval (-3, 1) with a step size of 1. Do only two iterations. The previous values of x and y are given in the following table. 10

X	-3	-2	-1	0
Y	-4.547	-2.306	-0.393	2