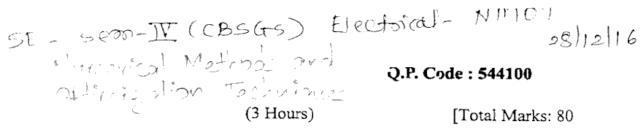
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N.B.:

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- 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 five marks
 - a What is significant figures? What are the rules on determining how many significant figures are in a number? Identify the number of significant figures in 0.00860.
 - b Compare Graphical and simplex method to solve a linear programming problem. How the multiple solution condition can be identified from the graphical and the simplex method?
 - c Given three data points (1,6) and (3,28), (5,35). Estimate 'x' at y=20 using Lagrange's method
 - d Given $\frac{dy}{dx} = x^2(1+y)$ and y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979, evaluate y(1.4) till the error is less than 1% using Adams-Bashforth method.
- 2 a Integrate the following set of differential equations using three approximations of 10 Picard's method. Calculate the values of y and z at x=1 by assuming that at x=0, y=4 and z=6.

$$\frac{dy}{dx} = -0.5y; \qquad \frac{dz}{dx} = 4-0.3z - 0.1y$$

- b Write the algorithm to find the root of an equation using secant and false position method. Compare the selection of guesses in each iteration of secant and false position method.
- What is meant by curve fitting? Compare least square fitting technique with interpolation technique. Using Newton's Divided difference method of order '3' find 'y' at x = 2.5 from the following data with maximum accuracy.

1						
	X	0	1	1.5	3	3.5
ĺ	У	1	0.5	-1	7	8.2

b A series RL circuit with R = 50 Ω and L = 10 H has a voltage V = 150 sin 1000t is applied at t = 0 by the closing of a switch. The differential equation to represent the system is given as $Ri + L\frac{di}{dt} = V$. Find the current at t = 1 sec taking h=0.5 using fourth order Runga Kutta method.

2 d 3-1

TURN OVER

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4

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Obtain the roots of following systems of equations using N-R method $f(x,y)=x^2+xy-10$ and $g(x,y)=y+3xy^2-57$ with the initial guesses as $x_0=1.5$ and $y_0=3.5$. Do only two iterations.

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Solve the following LP problem using Simplex method.

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Maximize Z = 3x + 2y

subject to: $2x + y \le 18$

$$2x + 3y \le 42$$
$$3x + y \le 24$$

$$x \ge 0$$
, $y \ge 0$

What is LU decomposition? What is the advantage of solving a set of linear algebraic equations using LU decomposition? Calculate the LU decomposition of

10

$$A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 8 & 5 \\ 1 & 11 & 4 \end{bmatrix}$$

10

A firm is engaged in producing two products. A and B. Each unit of product A requires 2 kg of raw material and 4 labour hours for processing, whereas each unit of B requires 3 kg of raw materials and 3 labour hours for the same type. Every week, the firm has an availability of 60 kg of raw material and 96 labour hours. One unit of product A sold yields Rs.40 and one unit of product B sold gives Rs.35 as profit. Formulate this as a Linear Programming Problem and determine how many units of each of the products should be produced per week 30 that the firm can earn maximum profit using graphical method.

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What are the different type of errors in numerical computation? How these errors are propogated under addition and multiplication?

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- Explain suitable techniques to solve the following optimization problem.
 - Multivariable optimization problem with no constraint.
 - 2. Multivariable optimization problem with equality constraint.

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