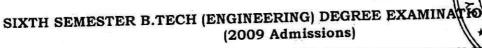
Name:

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EE/PTEE 09 L02 - NUMERICAL ANALYSIS AND OPTIMIZATIO

Time: Three Hours

Maximum

Part A Answer all questions

(a) Solve $x^3 - 9x + 1 = 0$ for the root lying between 2 and 4 using regula falsi method correct to two decimals.

(b) Show that the nth differences of a polynomial of nth degree are constant.

(c) Evaluate $\int f(x)dx$, using the Trapezoidal rule, given that

v	11	2	3	4	5	6	7
<u>~</u>	21	28	3.6	4.6	5.8	7.4	9.4

(d) Find a basic feasible solution of

$$x_1 + 2x_2 + x_3 = 4$$
 and

$$2x_1 + x_2 + 5x_3 = 5.$$

(e) What are the different methods to obtain an initial basic feasible solution in Transportation problem.

 $(5 \times 2 = 10 \text{ Marks})$

Part B Answer any four questions

II (a) Using Newton's method, find an iterative formula to find the reciprocal of a given number N and hence find the value of $\frac{1}{10}$

(b) Solve the following system by relaxation method

$$10x - 2y - 3z = 205$$

$$-2x + 10y - 2z = 154$$

$$-2x - y + 102 = 120.$$

(c) Evaluate $\int \frac{dx}{1+x}$ by applying the Simpson's $\left(\frac{3}{8}\right)^{th}$ rule. Hence, deduce the value of

(d) Construct the dual of the LPP:

$$Max Z = 3x_1 + 5x_2$$

subject to

$$2x_1 + 6x_2 \le 50$$

$$3x_1 + 2x_2 \le 35$$

$$5x_1 + 3x_2 \le 10$$

(e) Convert the following LPP to the standard form

Minimize
$$Z = x_1 + 2x_2 - 4x_3$$

Subject to
$$2x_1 + x_2 + 3x_3 \le 16$$

$$x_1 + x_2 + x_3 = 8$$

$$-x_1 + 2x_2 - x_3 \ge -7$$

$$x_1 + x_3 \le 2$$
, x_1 , x_2 , $x_3 \ge 0$

Turn over

(f) Obtain an initial basic feasible solution to the following transportation problem.

0 1					
Supply	F	E	D		
250	17	13	11	A	
300	14	18	16	В	Origin
400	13	24	21	C	
0	275	225	200	Demand	
50	275	24 225	21 200	C Demand	

Part C
Answer Section A or Section B of each question

III A (a) Solve by Crout's method

$$x + y + 2z = 7$$
, $3x + 2y + 4z = 13$, $4x + 3y + 2z = 8$. (5)

(b) Solve by Jacobi's iteration method, the equations 20x + y - 2z = 17, 3x + 20y - z = -18, 2x - 3y + 20z = 25. (5)

(Or)

B (a) The areas y of circles for different diameters x are given below: Calculate the area when x=98.

 x
 80
 85
 90
 95
 100

 f(x)
 5026
 5674
 6362
 7088
 7854

(5)

(b) Using Lagrange's interpolation formula, find f(5) from the following data

X	1	3	4	6	9
f(x)	-3	9	30	- 132	156

(5)

IV A (a) Using Euler's method, find an approximate solution of the problem $y^1 = x - y$, y(0) = 1 at the point 0.2. (5)

(b) Evaluate
$$\int_{0}^{6} \frac{dx}{1+x^2}$$
 by using the Simpson's $\left(\frac{3}{8}\right)^{th}$ rule. (5)

(Or)

B By using the Milne's Predictor corrector Method, find an approximate solution of the equation

$$\frac{dy}{dx} = \frac{2y}{x}, x \neq 0 \text{ at the point } x = 2,$$
given that $y(1) = 2, y(1.25) = 3.13, y(1.5) = 4.5 \text{ and } y(1.75) = 6.13.$ (10)

V A Solve the following LPP by using simplex method Maximize $z = 3x_1 + 5x_2$

Subject to

$$x_1 + x_2 \le 2$$

$$2x_1 + 5x_2 \le 10$$

$$8x_1 + 3x_2 \le 12, x_1, x_2 \ge 0$$
(10)

(Or)

B Use Two-phase method to solve the LPP:

Minimize $Z = 7.5x_1 - 3x_2$

Subject to
$$3x_1 - x_2 - x_3 \ge 3$$

 $x_1 - x_2 + x_3 \ge 2, x_1, x_2, x_3 \ge 0$ (10)

VI A Solve the following transportation problem

			Destina	ations		
		A	В	C	D	Supply
Origin	1	1	5	3	3	34
	2	3	5	1	2	15
	3	0	2 .	2	3	12
	4	2	7	2	4	19
	Demand	21	25	17	17	80

(Or)

(10)

B Use dynamic programming to solve Minimize $Z = y_1^2 + y_2^2 + y_3^2$ Subject to the constraints $y_1 + y_2 + y_3 \ge 15$

Minimize
$$Z = y_1^2 + y_2^2 + y_3^2$$

$$y_1 + y_2 + y_3 \ge 15$$

and
$$y_1, y_2, y_3 \ge 0$$

(10)