41257

Name : .....

Reg.No : .....

SIXTH SEMESTER B.TECH (ENGINEERING) DEGREE EXAMINATION, MAY 2013
(2009 Admissions)

EE/PTEE 09 L02 – NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

Time : Three Hours **Maximum : 70 Marks)**

Part A
Answer all questions

I (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 $\int_1^7 f(x)\,dx$, using the Trapezoidal rule, given that

x	1	2	3	4	5	6	7
y	2.1	2.8	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 x 2 = 10 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 $\frac{1}{19}$.

(b) Solve the following system by relaxation method

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

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

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

(c) Evaluate $\int_0^1 \frac{dx}{1+x}$ by applying the Simpson's $\left(\frac{3}{8}\right)^{th}$ rule. Hence, deduce the value of log 2.

(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.

		Destinations				
		D	E	F	G	Supply
Origin	A	11	13	17	14	250
	B	16	18	14	10	300
	C	21	24	13	10	400
	Demand	200	225	275	250	

(4 x 5 = 20 Marks)

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 $y(1)=2,\ y(1.25)=3.13,\ y(1.5)=4.5$ 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

$x_1+x_2\leq 2$

$2x_1+5x_2\leq 10$ (10)

$8x_1+3x_2\leq 12,\ x_1,\ x_2\geq 0$

(Or)

B Use Two-phase method to solve the LPP:

Minimize $Z=7.5x_1-3x_2$

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

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

Turn over

VI A Solve the following transportation problem

		Destinations				
		A	B	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

(10)

(Or)

B Use dynamic programming to solve

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

Subject to the constraints

$$y_1 + y_2 + y_3 \geq 15$$

and $y_1, y_2, y_3 \geq 0$

(10)

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