D 23150 (Pages : 4) Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2011

EE 04 705 (B)—NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

I. (a) Use the method of iteration to solve the equation $x^3 + x^2 - 1 = 0$.

(b) Solve by Gauss-Jacobi iteration method solve correct to three decimal places, the system of equations.

$$x + 17y - 2z = 48$$

$$30x - 2y + 3z = 75$$

$$2x + 2y + 18z = 30$$

(c) The velocity V of a particle at distance from a point on its path is given below :

x :	0	10	20	30	40
y :	45	60	65	54	42

Use Simpson's rule to find approximately the time taken to traverse the distance 40 units.

(d) Find the value of y for $x = 0.1$ by Picard's method given that $\frac{dy}{dx} = \frac{y - x}{y + x}$, $y(0) = 1$.

(e) Use simplex method to

Maximize $Z = 2x_1 - x_2 + x_3$

subject to the constraints $3x_1 + x_2 + x_3 \leq 60$

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

$$x_1 + x_2 - x_3 \leq 20$$

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

(f) Use two phase simplex method to

Maximise $Z = 10x_1 + 20x_2$

subject to the constraints $2x_1 + x_2 = 1$

$$x_1 + 2x_2 = 5$$

$$x_1 \geq 0,\ x_2 \geq 0.$$

Turn over

(g) Solve the following transportation problem

	To			
From	A	B	C	Available
I	6	8	4	14
II	4	9	8	12
III	1	2	6	5
Demand	6	10	15	

(h) Solve the following Assignment Problem :

	1	2	3	4
A	10	12	19	11
B	5	10	7	8
C	12	14	13	11
D	8	15	11	9

(8 × 5 = 40 marks)

Part B

II. (a) Find the real root of the following equations correct to three significant figures by Regula Falsi method

(i) $x^3 - 9x + 1 = 0$.

(ii) $x^3 - x^2 - 2 = 0$.

Or

(b) Solve by relaxation method to the nearest integer :

$$5x_1 - x_2 - x_3 - 3 = 0$$
$$-x_1 + 10x_2 - 2x_3 - 7 = 0$$
$$-x_1 - x_2 + 10x_3 - 8 = 0$$

and solve by relaxation method,

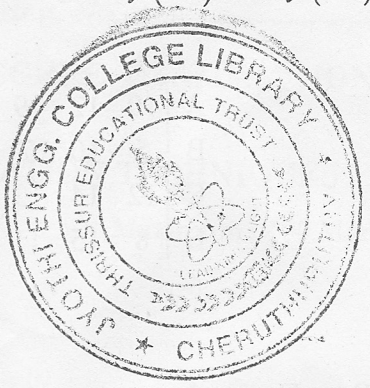
$$3x_1 + 9x_2 - 2x_3 = 11$$
$$4x_1 + 2x_2 + 13x_3 = 24$$
$$4x_1 - 4x_2 + 3x_3 = -8$$

III. (a) Use the trapezoidal rule to evaluate the integral of $y(x)$ from 0 to ½ π from data below :

x :	0	$\pi/12$	$2\pi/12$	$3\pi/12$	$4\pi/12$	$5\pi/12$	$6\pi/12$
$y(x)$:	0000	.25882	.50000	.70711	.86603	.96593	1.00000

Or

(b) Given $y'' = xy'^2 - y^2$ with $y(0)=1$, $y'(0)=0$, Obtain the values of $y(0.1)$ and $y(0.2)$ to 3 decimal places using Taylor series method.



IV. (a) Use two phase simplex method to :

(i) Maximize $Z = 10x_1 + 20x_2$

subject to the constraints $2x_1 + x_2 = 1$

$x_1 + 2x_2 = 5$

$x_1 \geq 0,\ x_2 \geq 0.$

(ii) Minimize $Z = x_1 + x_2$

subject to the constraints $2x_1 + x_2 \geq 4$

$x_1 + 7x_2 \geq 7$

$x_1,\ x_2 \geq 0.$

Or

(b) Use dual simplex method to solve the following

(i) Minimize $Z = x_1 + x_2$

subject to the constraints $2x_1 + x_2 \geq 4$

$x_1 + 7x_2 \geq 7$

$x_1,\ x_2 \geq 0.$

(ii) Maximize $Z = -2x_1 - x_2$

subject to the constraints $3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \geq 3$

$x_1,\ x_2 \geq 0$

V. (a) Solve the following Assignment Problems

(i)

	1	2	3	4
A	10	12	19	11
B	5	10	7	8
C	12	14	13	11
D	8	15	11	9

(b)

	M_1	M_2	M_3	M_4
J_1	5	8	3	2
J_2	10	7	5	8
J_3	4	10	12	10
J_4	8	6	9	4

Or

(b) Use dynamic programming to show that $Z = P_1 \log P_1 + P_2 \log P_2 + \ldots P_n \log P_n$ and subject to constraints $P_j \geq 0$ $P_1 + P_2 + \ldots + P_n = 1$ is a minimum when $P_1 = P_2 = \ldots = P_n = 1/n$.

(4 x 15 = 60 marks)