D 23469 (Pages : 3) Name.....

Reg. No.....

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

CS 04 504—NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

I. (a) Using Newton-Raphson method, find the root between 0 and 1 of $x^3 = 6x - 4$ correct to four decimal places.

(b) Find the value of y at $x = 21$ from the following data :—

x :	20	23	26	29
y :	0.3420	0.3907	0.4384	0.4848

(c) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by (i) Trapezoidal rule ; (ii) Simpson's $\frac{1}{3}$ rule.

(d) Compute y at $x = 0.25$ by Modified Euler method, given $y' = 2xy$, $y(0) = 1$.

(e) Solve the LPP using dual simplex method

Minimize $x_0 = 2x_1 + x_2$

subject to $3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 3$

$x_1, x_2 \geq 0.$

(f) Explain Charnes-M method.

(g) Find the starting solution of the following transportation model using Vogel's approximation method.

1	2	6	7
0	4	2	12
3	1	5	11
10	10	10	

(h) Discuss (i) Transportation problem ; (ii) Assignment problem.

(8 × 5 = 40 marks)

Turn over

Part B

II. (a) (i) Find the positive root of $x - \cos x = 0$ by bisection method. (7 marks)

(ii) Solve the following system by using Gauss-Seidel method :

$$8x - 3y + 2z = 20$$
$$4x + 11y - z = 33$$
$$6x + 3y - 12z = 35.$$

(8 marks)

Or

(b) (i) Using Newton's divided difference formula, find the values of $f(2)$, $f(8)$, given the following table :

x :	4	5	7	10	11	13
y :	48	100	294	900	1210	2028

(8 marks)

(ii) Using Lagrange's interpolation formula, find $y(10)$, from the following table :—

x :	5	6	9	11
y :	12	13	14	16

(7 marks)

III. (a) The population of a certain town is given below. Find the rate of growth of the population in 1931, 1941, 1961 and 1971.

Year x	1931	1941	1951	1961	1971
Polution in thousands y	40.62	60.80	79.95	103.56	132.65

(15 marks)

Or

(b) (i) Given $y' = x + y$, $y(0) = 1$. Find y (0.1) using Runge-Kutta fourth order method.

(8 marks)

(ii) Find $y(2)$ if $y(x)$ is the solution of $\frac{dy}{dx} = \frac{1}{2}(x+y)$ given $y(0) = 2$, $y(0.5) = 2.636$ $y(1) = 3.595$ and y (1.5) = 4.968.

(7 marks)

IV. (a) Solve by using simplex method

Maximize $x_0 = 3x_1 + 2x_2 + 5x_3$

subject to $x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460$

$x_1 + 4x_2 \leq 420$

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

(15 marks)

Or

(b) Solve by using Two-phase technique :

Minimize $x_0 = 4x_1 + x_2$

subject to $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 3$

$x_1, x_2 \geq 0.$

(15 marks)

V. (a) Solve the following transportation model by using :—

(i) North west corner rule ; (ii) Least cost method and (iii) Vogel's approximation method. Compare the computation.

1	2	6	7
0	4	2	12
3	1	5	11
10	10	10	

(15 marks)

Or

(b) Solve the following assignment problem for the maximum assignment.

$(C_{ij}) =$

8	7	9	9
5	2	7	8
6	1	4	9
2	3	2	6

(15 marks)

[4 × 15 = 60 marks]