BACHELOR OF ENGINEERING IN INFORMATION TECHNOLOGY

2ND YEAR 2ND SEMESTER, EXAMINATION, 2019

NUMERICAL METHODS AND OPTIMIZATION TECHNIQUES

TIME=3 HOURS **FULL MARKS=100**

CO1 [20]

Q1.

(a) Compute the positive root of $x^3 - x - 0.1=0$, by Newton-Raphson Method, correct to six significant figures.

(b) Given the following table:

x	0	5	10	15	20
f(x)	1.0	1.6	3.8	8.2	15.4

Construct the difference table and compute f (21) by Newton's Backward Formula. [(10+10)=20]

CO2 [20]

(Answer any one either Q2 or Q3)

Q2.

(a) Evaluate $\int_0^1 x^3 dx$ by Trapezoidal Rule with n=5(Where n is the number of equispace).

(b) Compute y(0.6) by Runge-Kutta method correct to five decimal places, from the equation given here $\frac{dy}{dx} = xy, y(0) = 2, taking\ h = 0.2$ [(10+10)=20]

Q3.

(a) Evaluate $\int_0^1 \cos x\ dx$ by Simpson's One Third Rule, taking six equal interval.

(b)Solve by Euler's Method, the following differential equation for x=0.8 by taking h=0.2 $\frac{dy}{dx} = xy, y(0) = 1$ [(10+10)=20]

CO3 [20]

Q4.

(a)Solve by Gauss –Seidel iteration method, the system of equation is given below

$X_1 + X_2 + 4X_3=9$

$8X_1 - 3X_2 + 2X_3=20$

$4X_1 + 11X_2 - X_3=33$

(b)Write down the comparison between direct method and iterative method to solve the system of linear equation. [(15+5)=20]

CO4 [20]

Q5.

(a) Write the dual of the following primal LP problem.

Max $Z = X_1 + 2X_2 + X_3$

Subject to, $2X_1+X_2-X_3 \leq 2$

$-2X_1+X_2-5X_3 \geq -6$

$4X_1+X_2+X_3 \leq 6$

$X_1, X_2, X_3 \geq 0$

(b) Using simplex method solve the LPP.

Max $Z=3X_1+2X_2$

Subject to, $X_1+X_2\leq 4$

$X_1-X_2\leq 2$

$X_1, X_2\geq 0$ [(5+15)=20]

CO5 [20]

(Answer any one either Q6 or Q7)

Q6.

(a)Find the initial basic feasible solution for the following Transportation problem by VAM. The matrix is given here.

Origin	Destinations				
	D1	D2	D3	D4	Supply
O1	11	13	17	14	250
O2	16	18	14	10	300
O3	21	24	13	10	400
Demand	200	225	275	250	950

(b) Write down the differences between transportation problem and Assignment problem. [(15+5)=20]

Q7.

A project schedule has the following characteristics

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Duration (Days)	4	1	1	1	6	5	4	8	1	2	5	7

(a)Draw the Network diagram representing the project.

(b)Find the total float and Free Float for each activity.

(c) Find the critical path and total project duration. [(5+10+5)=20]

CO1: Estimate the roots of polynomials, and Compute the Interpolation of polynomials. (K3, A2)

CO2: Compute derivatives and integration and solve differential equations. (K3, A2)

CO3: Solve and analyze simultaneous linear equations (K3, A2)

CO4: Construct Linear Programming and solve them using graphical methods and simplex methods and dual problem (K3,A2)

CO5: Solve transportation, assignments and Networks problem (K2, A2)