647510 **BSc6MatC603x** **Seat No :________**

B.Sc. Semester - 6 (*CBCS*) Examination
May/June-2021 (NEW COURSE)
Optimization and Numerical Analysis -2(Core)

Time: 1:30 Hours **Marks: 42**

Instructions:

1. Figures to the right indicate marks.
2. There are five questions in the question paper.
3. Answer any three of the following questions.

Q.1(A) **Answer any two of the following questions.** (10)

(1) Explain Canonical form of an LPP with its characteristics.

(2) Solve the following LPP by graphical method.

$$MinZ = 2x_1 - x_2$$

Subject to
$$x_1 + x_2 \leq 5,$$
$$x_1 + 2x_2 \leq 8,$$
$$x_1, x_2 \geq 0.$$

(3) Solve the following LPP by Big-M Method.

$$MinimizeZ = x_1 - 3x_2 + 2x_3$$

Subject to
$$3x_1 - x_2 + 2x_3 \leq 7$$
$$-2x_1 + 4x_2 \leq 12$$
$$-4x_1 + 3x_2 + 8x_3 \leq 10$$
and $x_1, x_2, x_3 \geq 0$

Q.1(B) **Answer any one of the following questions.** (04)

(1) Define:Feasible solution, Optimum Solution, Basic Solution and Degenerate Basic Feasible Solution of an LPP.

(2) Define Convex set & Convex Combination. Prove that Interval $I = [a, b] \subset R$ is convex.

Q.2(A) **Answer any two of the following questions.** (10)

(1) Describe Vogel's approximation method to find initial solution of a transportation problem.

(2) Explain North West Corner Method (NWCM) to find initial solution of a transportation problem.

(3) Find optimal basic feasible solution by MODI method.

	X	Y	Z	W	Supply
A	21	16	25	13	11
B	17	18	14	23	13
C	32	27	18	41	19
Demand	6	10	12	15	43

Q.2(B) **Answer any one of the following questions.** (04)

(1) Find dual of the following primal LPP.

$$MaxZ_x = 8x_1 + 3x_2$$

Subject to $x_1 - 6x_2 \geq 2$
$$5x_1 + 7x_2 = -4$$
$$x_1, x_2 \geq 0.$$

(2) Solve the following assignment problem.

		Men			
		1	2	3	4
JOB	A	10	12	19	11
	B	5	10	7	8
	C	12	14	18	11
	D	8	15	11	9

Q.3(A) **Answer any two of the following questions.** (10)

(1) Derive Gauss's backward interpolation formula.

(2) Show that n^{th} divided difference of a polynomial of n^{th} degree is constant.

(3) Given $y_1 = 22, y_2 = 30, y_4 = 82, y_7 = 106, y_8 = 206$. Find y_6 using Lagrange's interpolation formula.

Q.3(B) **Answer any one of the following questions.** (04)

(1) Derive relation between divide differences and forward differences.

(2) Derive Sterling's formula.

Q.4(A) **Answer any two of the following questions.** (10)

(1) State and prove Simpson's 1/3 rule.

(2) Derive Newton's divided difference formula.

(3) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at *x* = *1.1* for the following data.

X	1.0	1.1	1.2	1.3	1.4	1.5	1.6
Y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Q.4(B) **Answer any one of the following questions.** (04)

(1) Evaluate $\int_4^5 log(x)dx$ using Trapezoidal rule.

(2) Evaluate $\int_0^{10} \frac{1}{1+x^2} dx$ using Simpson's 3/8 rule.

Q.5(A) **Answer any two of the following questions.** (10)

(1) Solve $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$ by modified Euler's method.

(2) Solve $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$ by Runge Kutta's method.

(3) If $\frac{dy}{dx} + y = x, y(0) = 1$,then find $y(0.2)$ using Picard's method.

Q.5(B) **Answer any one of the following questions.** (04)

(1) Solve the differential equation $\frac{dy}{dx} = f(x, y)$ with initial condition $x = x_0, y = y_0$ by Picard's method.

(2) Using Taylor's series method to solve $\frac{dy}{dx} = y(x + y), y(0) = 1$ at x = 0.1.

****