647510 **BSConaCC6030** **Seat No :________**

B.Sc. Semester - 6 (*CBCS*) Examination
May/June-2021 (OLD 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 one of the following questions. **[07]**

(1) Solve the following linear programing problem by graphical method.
$MinZ = 20x_1 + 10x_2$ Subject to $x_1 + 2x_2 \leq 40, 3x_1 + x_2 \geq 30, 4x_1 + 3x_2 \geq 60, x_1, x_2 \geq 0$.

(2) Explain Two- phase method.

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

(1) Explain slack variable and surplus variable.

(2) Define convex set and convex function.

Q.1 (C) Answer any one of the following questions. **[03]**

(1) Write matrix form of a linear programing problem.

(2) Discuss how to assign coefficients to artificial variables in objective function in Big M method.

Q. 2 (A) Answer any one of the following questions. **[07]**

(1) Find optimum solution of the following transportation problem.

		TO				
		P	Q	R	S	Supply
From	X	5	3	6	4	30
	Y	3	4	7	8	15
	Z	9	6	5	8	15
Demand		10	25	18	7	

(2) Solve the following assignment problem.

		Men			
		I	II	III	IV
Tasks	A	8	26	17	11
	B	13	28	4	26
	C	38	19	18	15
	D	19	26	24	10

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

(1) Explain primal-dual relationship for linear programing problem.

(2) Explain Least Coast Method (LCM) to solve a transportation problem.

Q.2 (C) Answer any one of the following questions. **[03]**

(1) Write full names of methods to find initial solution and optimum solution of a transportation problem.

(2) What is the meaning of $d_{ij} > 0 for all\ i, j, d_{ij} = 0$ and $d_{ij} < 0$ for some *i,j* For unoccupied cells in MODI method.

Q.3 (A) Answer any one of the following questions. **[07]**

(1) Derive Gauss's forward interpolation formula.

(2) Prove that divided differences are symmetrical in all their arguments.

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

(1) Explain inverse interpolation and write Lagrnge's interpolation formula.

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

Q.3 (C) Answer any one of the following questions. **[03]**

(1) Write Sterling's interpolation formula and explain when it is useful?

(2) If *f(1) = 2, f(1,3) = 13, f(1,3,6) = 10* and *f(1,3,6,9) = 1*, then prove that $f(x) = x^3 + 1$.

Q.4 (A) Answer any one of the following questions. **[07]**

(1) Find the value of $sec^2 31°$from the following table using numerical differentiation.

θ	31	32	33	34
$tan\theta$	0.6008	0.6249	0.6494	0.6745

(2) Derive Newton-cote's quadrature formula and hence deduce Simpsion's 3/8 rule.

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

(1) Evaluate $\int_4^{5.2} log(x)dx$ using Simpsion's 1/3 rule.

(2) State and prove trapezoidal rule.

Q.4 (C) Answer any one of the following questions. **[03]**

(1) Derive formula to find $\frac{dy}{dx}$ at $x = x_0$from Newton's forward difference formula.

(2) Find the value of $\int_4^8 \frac{1}{x} dx$ using Trapezoidal rule.

Q.5 (A) Answer any one of the following questions. **[07]**

(1) Derive Milne's predictor and corrector formula.

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

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

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

(2) Let $\frac{dy}{dx} = 3x + y^2, y(1) = 1.2$. Find approximate value of $y(1.1)$ by Runge's method.

Q.5 (C) Answer any one of the following questions. **[03]**

(1) Write working rule of Runge's method.

(2) Let $\frac{dy}{dx} = x + y, y(0) = 1$. Find first approximation of $y$at $x = 0.1$ by picard's method.

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