647510 **BSConaCC6030** **Seat No :_____**

B.Sc. Semester - 6 (*CBCS*) Examination
March/April-2023 (OLD COURSE)
OPTIMIZATION AND NUMERICAL ANALYSIS -2(CORE)

Time: 2:30 Hours **Marks: 70**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1(A) Answer the following question. (Any One) **(07)**

1. Solve following L.P.P. using simplex method

Maximize $Z= 3X_1+5X_2+4X_3$

Subject to: $2X_1+3X_2 \leq 8$

$2X_2+5X_3 \leq 10;$

$3X_1+2X_2+4X_3 \leq 15; \quad X_1,X_2,X_3 \geq 0$

2. Explain Graphical Method to find solution of L.P.P.

Q.1(B) Answer the following questions. (Any One) **(04)**

1. Find Duel of following L.P.P.

Minimize $Z= X_1-3X_2-2X_3$

Subject to: $3X_1-X_2+2X_3 \leq 7$

$2X_1-4X_2 \geq 12;$

$4X_1-3X_2-8X_3=10; \quad X_1,X_2,X_3 \geq 0$

2. Explain method to find Duel of given L.P.P.

Q.1(C) Answer the following question. (Any One) **(03)**

1. Define slack variable and surplus variable.

2. Write Canonical form of Linear Programming Problem.

Q.2(A) Answer the following question. (Any One) **(07)**

1. Explain Hungarian Method to find solution of Assignment Problem.

2. Find initial solution of following Transportation Problem using VAM for minimize.

	TO					Supply
FROM		D1	D2	D3	D4	
	F1	19	30	50	10	7
	F2	70	30	40	60	9
	F3	40	8	70	20	18
Demand		5	8	7	14	

Q.2(B) Answer the following questions. (Any One) **(04)**

1. Explain VAM to find initial solution of Transportation Problem.

2. Find solution of following Assignment Problem for minimize.

	EMPLOYEES					
JOBS		1	2	3	4	5
	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

Q.2(C) Answer the following question. (Any One) **(03)**

1. Explain N W corner rule to find initial solution of Transportation Problem.
2. Explain LCM to find initial solution of Transportation Problem.

Q.3(A) Answer the following question. (Any One) **(07)**

1. Derive Bessel's interpolation formula for central differences.
2. In usual notation derive Laplace-Everett's interpolation formula.

Q.3(B) Answer the following questions. (Any One) **(04)**

1. Derive relation between divide differences and forward differences.
2. Use Lagrange's interpolation formula to find the value of Y for X=10 from given table.

X	5	6	9	11
Y	12	13	14	16

Q.3(C) Answer the following question. (Any One) **(03)**

1. If $f(x) = x^3 - 2x$ then show that $f(2, 4, 9, 10) = 1$
2. Use Lagrange's interpolation formula to find the value of Y for X=1 from given table.

X	0	2	3	6
Y	648	704	729	792

Q.4(A) Answer the following question. (Any One) **(07)**

1. Obtain derivatives using Gregory Newton's forward difference formula.
2. Obtain f'(0.04) using Bessel's formula from the following data.

x	0.01	0.02	0.03	0.04	0.05	0.06
f(x)	0.1023	0.1047	0.1071	0.1096	0.1122	0.1148

Q.4(B) Answer the following questions. (Any One) **(04)**

1. Derive Trapezoidal rule.
2. Evaluate $\int_0^{\pi/2} sin\ x\ dx$ by Trapezoidal rule.

Q.4(C) Answer the following question. (Any One) **(03)**

1. In usual notation prove that $D=\frac{1}{h}[\ \Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \frac{\Delta^4}{4} + \ldots\ldots\ ]$
2. Find $\int_2^6 \frac{dx}{x}$ using Simpson's 3/8 rule.

Q.5(A) Answer the following question. (Any One) **(07)**

1. Solve $\frac{dy}{dx} = f(x,y)$, $y(x_0)=y_0$, by Milne's predictor – corrector method.
2. Derive Euler's improved method, for $\frac{dy}{dx} = f(x,y)$, $y(x_0)=y_0$.

Q.5(B) Answer the following questions. (Any One) **(04)**

1. Solve $\frac{dy}{dx} = f(x,y)$, $y(x_0)=y_0$, by Picard's method
2. Solve $\frac{dy}{dx} = 3x + \frac{y}{2}$; $y(0) = 1$ and find $y(0.1)$ using Taylor's series method

Q.5(C) Answer the following question. (Any One) **(03)**

1. Solve $y' = -y$; $y(0)=1$ by Euler's method for $x=0.04$
2. Using Range's method, find y at $x= 0.2$ given $\frac{dy}{dx} = x+y$, $y(0)=1$.

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