647510 **BSc6MatC603x** **Seat No :_____**

B.Sc. Semester - 6 (*CBCS*) Examination
March/April-2024 (NEW COURSE)
Optimization and Numerical Analysis-2 (Core (New))

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

Instructions:

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

Que-1(A) Answer any Two out of Three **(10)**

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

Maximize $Z= 3X_1+2X_2$

Subject to: $2X_1+X_2 \leq 10$;

$X_1+3X_2 \leq 6$; $X_1, X_2 \geq 0$

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

(3) Explain method to find dual of given L.P.P.

Que-1(B) Answer any One out of Two **(04)**

(1) Find dual of following L.P.P.

Minimize $Z= X_1+2X_2$

Subject to: $2X_1+4X_2 \leq 160$

$X_1-X_2=30$;

$X_1 \geq 10$; $X_1, X_2 \geq 0$

(2) Define slack variable and surplus variable.

Que-2(A) Answer any Two out of Three **(10)**

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

(2) Explain Hungarian Method to find solution of Assignment Problem.

(3) Find initial solution of following Transportation Problem using VAM for minimize.

		TO			**Supply**
		D1	**D2**	**D3**	
FROM	**F1**	2	7	4	5
	F2	3	3	1	8
	F3	5	4	7	7
	F4	1	6	2	14
Demand		**7**	**9**	**18**	**34**

Que-2(B) Answer any one out of two **(04)**

(1) Explain LCM to find initial solution of Transportation Problem.

(2) Find solution of following Assignment Problem for minimize.

	EMPLOYES					
		E1	**E2**	**E3**	**E4**	**E5**
JOBS	**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

Que-3(A) Answer any two out of three. **(10)**

(1) Derive Laplace-Everett's interpolation formula for equally spaced set of points.

(2) Derive Newton's divided difference formula for unequally spaced points.

(3) Derive Gauss's forward interpolation formula for equally spaced set of points.

Que-3(B) Answer any one out of two. **(04)**

(1) Apply Bessel's formula to obtain Y_{25}, given that $Y_{20} = 2854$, $Y_{24} = 3182$, $Y_{28} = 3544$, $Y_{32} = 3992$.

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

Que-4(A) Answer any Two out of Three **(10)**

(1) Explain numerical integration and derive general quadrature formula.

(2) Derive first order and second order derivatives using Gregory Newton's backward interpolation formula.

(3) Obtain f'(0) from the following data.

x	0	1	2	3	4	5
f(x)	4	8	15	7	6	2

Que-4(B) Answer any one out of two **(04)**

(1) Derive Simpson's 3/8 rule.

(2) Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by Trapezoidal rule correct up to five decimal places by taking at least ten partitions.

Que-5(A) Answer any Two out of Three **(10)**

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

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

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

Que-5(B) Answer any one out of two **(04)**

(1) Solve $y' = x - y$; $y(1) = 0.4$ by Runge's method for $x = 1.6$ by taking $h = 0.3$.

(2) Solve $\frac{dy}{dx} = x + y$; $y(1) = 0$ and find $y(1.1)$ using Euler's method by taking $h = 0.05$.

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