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

B.Sc. Semester - 6 (*CBCS*) Examination
March/April-2024 (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.

Que-1(A) **Answer any One out of Two** **(07)**

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

Minimize $Z= X_1+2X_2$

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

$X_1-X_2=30$;

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

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

(1) Explain Graphical method to find solution of L.P.P.

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

Que-1(C) **Answer any One out of Two** **(03)**

(1) Define slack variable and surplus variable.

(2) Write Canonical form of Linear Programming Problem.

Que-2(A) **Answer any One out of Two** **(07)**

(1) 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**

(2) Find optimum solution of following Transportation Problem.

		TO				Supply
		D1	**D2**	**D3**	**D4**	
FROM	**F1**	19	14	23	11	11
	F2	15	16	12	21	13
	F3	30	25	16	39	19
Demand		**6**	**10**	**12**	**15**	

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

(1) 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

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

Que-2(C) Answer any one out of two **(03)**

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

(2) Explain NWCR to find initial solution of Transportation Problem.

Que-3(A) Answer any one out of two. **(07)**

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

(2) Derive Newton's divided difference formula for a set of unequally spaced 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 nth divided differences of a polynomial of nth degree are constant.

Que-3(C) Answer any one out of two **(03)**

(1) If $f(x) = x^3 - 2x$ then show that $f(2, 4, 9, 10) = 1$

(2) Derive relation between divided difference and forward difference operator.

Que-4(A) Answer any one out of two. **(07)**

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

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

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 5 decimal places by taking at least 10 partitions.

Que-4(C) Answer any one out of two **(03)**

(1) In usual notations, prove that $D=\frac{1}{h}\left[\Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \frac{\Delta^4}{4} + \ldots\ldots\right]$

(2) Find $\int_2^6 \frac{dx}{x}$ using Simpson's 3/8 rule correct up to 4 decimal places by taking 6 partitions.

Que-5(A) Answer any one out of two. **(07)**

(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.

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 $h=0.05$.

Que-5(C) Answer any one out of two **(03)**

(1) Solve $y' = -y$; $y(0)=1$ by modified Euler's method for $x=0.04$

(2) Solve $y' = 3x + y/2$: $y(0) =1$ and find $y(0.1)$ using Taylor's series method.

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