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

B.Sc. Semester - 6 (*CBCS*) Examination
March/April -2020
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) Attempt any two (out of three)** **(10)**

(1) Explain Big-M method to solve linear programming problems.

(2) Solve following LPP using Big-M method:

Minimize: $Z=5x+3y$,

Subject to: $2x+4y\leq 12$,

$2x+2y= 10$,

$5x+2y\geq 10$ and $x,y\geq 0$

(3) Explain the rules for converting primal Linear Programming problem In to dual Linear Programming problem.

(B) Attempt any one (out of two) **(04)**

(1) Solve the following LPP by Graphical Method:

Maximize: $Z=5x+7y$

Subject to: $x + y \leq 4$, $3x + 8y \leq 24$, $10x + 7y \leq 35$ and $x,y \geq 0$

(2) Change following LPP in dual form:

Minimize: $Z_x = 5x_1 + 2x_2 + x_3$,

Subject to : $x_1 - 3x_2 + 4x_3 = 5$,

$x_1 - 2x_2 + 0x_3 \leq 3$,

$0x_1 + 2x_2 - x_3 \geq 4$ and $x_1, x_2 \geq 0$, x_3 is unrestricted sign.

Q.(2) (A) Attempt any two (out of three) **(10)**

(1) Write Hungerian Method for assignment problem.

(2) Explain VAM method for initial solution of transportation problem.

(3) Solve the following transportation problem by NWCM and LCM method.

	W_1	W_2	W_3	SUPPLY
F_1	2	7	4	5
F_2	3	3	1	8
F_3	5	4	7	7
F_4	1	6	2	14
Demand	7	9	18	

(B) Attempt any one (out of two) **(04)**

(1) Solve the following assignment problem.

		Men			
		1	2	3	4
JOB	I	12	30	21	15
	II	18	33	09	31
	III	44	25	24	21
	IV	23	30	28	14

(2) Solve the following assignment problem:

	Employers				
JOB	I	II	III	IV	V
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.3 (A) Attempt any two (out of three) **(10)**

(1) Derive Gauss's forward interpolation formula and hence deduce Laplace-Everett's interpolation formula.

(2) Obtain Lagrange's interpolation formula for unequal intervals.

(3) Obtain Newton's divided difference formula and hence deduce Newton's forward interpolation formula.

(B) Attempt any one (out of two) **(04)**

(1) Find a polynomial satisfied by the following table values:

X	- 4	- 1	0	2	5
f(x)	1245	33	5	9	1335

(2) Apply Lagrange's formula inversely to obtain a root of the equation f(x)=0, given that f(30)=-30, f(34)=-13, f(38)=3, and f(48)=18

Q.4 (A) Attempt any two (out of three) **(10)**

(1) What is numerical differentiation? In usual notation prove that

(i) $D=\frac{1}{h}\{\Delta-\frac{1}{2}\Delta^2+\frac{1}{3}\Delta^3-\frac{1}{4}\Delta^4+.....\}$

(ii) $D=\frac{1}{h}[\nabla + ½\,\nabla^2 + \frac{1}{3}\nabla^3 + \frac{1}{4}\nabla^4 .....]$

(2) Derive Newton-Cote's quadrature formula and hence deduce Simpson's $3/8^{th}$ rule.

(3) State Newton-Cote's general quadrature formula and hence deduce

(i) Trapezoidal rule

(ii) Simpson's $1/3^{rd}$ rule.

(B) Attempt any one (out of two) **(04)**

(1) Obtain the value of f'(90) using Stirling's formula to the following Data.

X	60	75	90	105	120
f(x)	28.2	38.2	43.2	40.9	37.7

(2) A river is 80 feet wide. The depth d in feet at a distance x feet from one bank is given by the following table:

Xft	0	10	20	30	40	50	60	70	80
d ft	0	4	7	9	12	15	14	8	3

Find approximately the area of the cross section.

Q.5 (A) Attempt any two (out of three) **(10)**

(1) Explain Euler's method for obtaining the approximate solution of the Differential equation $\frac{dy}{dx}$ =f(x,y). Also explain what modification are Done in its modified method.

(2) Discuss Taylor's series method for the numerical solution of the Differential equation $\frac{dy}{dx}$ =f(x,y) subject to the initial conditions $y=y_0$ when $x=x_0$.

(3) Obtain Milne's predictor and corrector formula to solve the Differential equation $\frac{dy}{dx}$ =f(x,y) ; $y(x_0)=y_0$

(B) Attempt any one (out of two) **(04)**

(1) Solve the differential equation $\frac{dy}{dx}$ = x+y by Picard's method at x=0.1With initial condition y(0)=1.

(2) If $\frac{dy}{dx}$ =1-y, y(0)=0 then find value of y at x=0.1,0.2,0.3 by Euler's method

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