Total No. of Questions : 4]

SEAT No. :

PE3469

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OR-209-T : OPERATIONS RESEARCH - I
(2024 Credit Pattern) (NEP) (Semester - III)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question No. 1 is Compulsory.***
2) ***Attempt any 2 Questions from the remaining Question No. 2 to 5.***
3) ***Use of simple calculator is allowed.***
4) ***Figures to the right indicate full marks.***

Q1) Fill in the blanks by selecting correct option from the given options : **[5]**

a) To convert the transportation problem into a maximisation model we have to

i) Write the inverse of the matrix

ii) Multiply the rim requirements by - 1

iii) Subtract all the values from the maximum value of the matrix

iv) We cannot convert the transportation problem into maximization problem, as it is basically, a minimization problem

b) When the total allocations in a transportation model of $m \times n$ size do not equal to the $m + n - 1$ situation is known as

i) Unbalanced situation ii) Tie situation

iii) Degeneracy iv) None of the above

c) In the North West Corner method the allocations are made

i) Starting from the left-hand side top corner

ii) Starting from the right-hand side top corner

iii) Starting from the lowest cost cell

iv) Starting from the lowest requirement and satisfying first

d) Any solution to a Linear Programming Problem which also satisfies the non-negative notifications of the problem has _____.

i) Solution ii) Basic solution

iii) Basic feasible solution iv) Feasible solution

e) The cost of a slack variable is _____.

i) 0 ii) 1

iii) 2 iv) –1

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f) _____ method is an alternative method of solving a Linear Programming Problem involving artificial variables.

i) Simplex method ii) Big-M method

iii) Dual simplex method iv) Graphical method

g) The assignment problem is solved by

i) Complex method ii) Graphical method

iii) Vector method iv) Hungarian method

Q2) Attempt the following : **[15]**

a) Solve the following LPP by simplex method

Maximize $Z = 3x_1 + 2x_2$

Subject to conditions

$x_1 + x_2 \leq 4$

$x_1 - x_2 \leq 2$

$x_1, x_2 \geq 0$

b) Solve the following LPP by Big-M method

Maximize $Z = 3x_1 - x_2$

Subject to conditions

$2x_1 + x_2 \geq 2$

$x_1 + 3x_2 \leq 3$

$x_2 \leq 4$

$x_1, x_2 \geq 0$

c) Write the procedure to convert primal linear programming problem to its duality.

Q3) Attempt the following : **[15]**

a) Find an initial basic feasible solution of the following transportation problem by NWCR method.

Destination → Source	W1	W2	W3	W4	Capacity
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Demand	5	8	7	14	34

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b) Find an initial basic feasible solution of the following transportation problem by Vogels Approximation method (VAM).

Destination → Source	D1	D2	D3	D4	Capacity
O1	21	16	15	13	11
O2	17	18	14	23	13
O3	32	27	18	41	19
Demand	6	10	12	15	

c) Find the optimum cost schedule for the following transportation problem

Destination → Source	D1	D2	D3	Availability
O1	2	7	4	5
O2	3	3	1	8
O3	5	4	7	7
O4	1	6	2	14
Requirement	7	9	18	

Q4) Attempt any three of the following : **[15]**

a) What is transportation problem? Explain how to convert unbalanced transportation problem to balanced transportation problem.

b) Write the Hungarian method to solve assignment problem.

c) Write the procedure to obtain initial basic feasible solution by Matrix Minima Method (Least Cost Method)

d) Write the algorithm to solve the LPP by simplex method.



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