

SEAT No. \_\_\_\_\_

No. of Printed Pages: 2

[3/5]

**SARDAR PATEL UNIVERSITY**  
**B.sc(CA & IT) ( SEMESTER-III) EXAMINATION-2021**

1<sup>st</sup> January, 2021, Friday

10:00 a.m to 11:00 a.m

VS03SIIT22 / PS03SIIT22(Operation Research-I)

Maximum Marks:35

[05]

**Q-1 Multiple choice Questions**

- 1 A constraint in an LP model restricts  
 (A) value of the objective function (B) value of the decision variable  
 (C) use of the available resources (D) all of the above
- 2 To convert  $\geq$  inequality constraints into equality constraints, we must  
 (A) add a surplus variable  
 (B) subtract an artificial variable  
 (C) subtract a surplus variable and an artificial variable  
 (D) add surplus variable and subtract an artificial variable
- 3 The number of non negative variable in a basic feasible solution to a  $m \times n$  transportation problem is  
 (A)  $mn$  (B)  $m+n$  (C)  $m+n-1$  (D)  $m+n+1$
- 4 From the following methods \_\_\_\_\_ is a method to obtain initial basic feasible solution to Transportation Problem.  
 (A) North-West (B) Simplex (C) Hungarian (D) Newton Raphson
- 5 The Penalty in VAM represents difference between \_\_\_\_\_ cost of respective row/column.  
 (A) Two Largest (B) smallest two (C) largest and smallest (D) none

[04]

**Q-2 Fill in the blanks & True or False.**

- 1 In graphical representation the bounded region is known as \_\_\_\_\_ region.
- 2 A variable which does not appear in the basic variable (B) column of simplex table is always equal to zero (true/false)
- 3 Every loop has \_\_\_\_\_ number of cells
- 4 North – West corner refers to top left corner (true /false)

[10]

**Q-3 Short questions(Attempt any five)**

- 1 Write the definition of operation research.
- 2 Write down any two scopes of OR.
- 3 Define slack variables.
- 4 Define artificial variables.
- 5 What is transportation problem?
- 6 Write mathematical form of transportation problem?
- 7 What do you mean by balanced transportation problem?
- 8 Define loop in MODI method.

[16]

**Q-4 Do as directed(Attempt any four)**

- 1 Solve the following LP problems graphically  
 Maximize  $Z = 5x_1 + 7x_2$   
 Subject to.  $x_1 + x_2 \leq 4$   
 $10x_1 + 7x_2 \leq 35$   
 $x_1, x_2 \geq 0$

[15]

[P.T.O.]

- 2 Solve the following LP problems graphically

$$\begin{aligned} \text{Maximize } z &= 3x_1 + 5x_2 \\ \text{s.t. } x_1 + 2x_2 &\leq 20 \\ x_1 + x_2 &\leq 15 \\ x_2 &\leq 8, \\ x_1, x_2 &\geq 0 \end{aligned}$$

- 3 Writ Dual of given problem

$$\begin{aligned} \text{Min } Z &= 7x_1 + 3x_2 + 8x_3 \\ \text{s.t. } 8x_1 + 2x_2 + x_3 &\geq 3 \\ 3x_1 + 6x_2 + 4x_3 &\geq 4 \\ 4x_1 + x_2 + 5x_3 &\geq 1 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

- 4 Solve by simplex method:

$$\begin{aligned} \text{maximize } Z &= 3x_1 + 5x_2 \\ \text{s.t. } x_1 + x_2 &\leq 4 \\ 3x_1 + 2x_2 &\leq 18 \\ x_1, x_2 &\geq 0 \end{aligned}$$

- 5 Obtain the initial basic feasible solution of the following Transportation Problem using Northwest corner method.

	D1	D2	D3	D4	Supply
O1	19	30	50	10	7
O2	70	30	40	60	9
O3	40	8	70	20	18
Demand	5	8	7	14	

- 6 Obtain the initial basic feasible solution of the following Transportation Problem using Vogel's approximation method

	A	B	C	D	Supply
I	1	5	3	3	34
II	3	3	1	2	15
III	0	2	2	3	12
IV	2	7	2	4	19
Demand	21	25	17	17	

- 7 Obtain the optimal solution of the following Transportation Problem.

	D1	D2	D3	D4	Supply
O1	1	2	3	4	6
O2	4	3	2	0	8
O3	0	2	2	1	10
Demand	4	6	8	6	

- 8 Find Basic Initial feasible Solution of Un balanced Transportation Problem using Least cost method

	A	B	C	D	E	Supply
I	5	4	8	6	5	600
II	4	5	4	3	2	400
III	3	6	5	8	4	1000
Demand	450	400	200	250	300	

— X —