

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2020****Subject Code:2171503****Date:25/01/2021****Subject Name:Resource Optimization Techniques****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- MARKS**
- Q.1** (a) What do you mean by 'Resource optimization'? **03**
 (b) State the application of ROT in industrial context. **04**
 (c) Explain various phases of OR to solve any problem of industries for optimum solution. **07**
- Q.2** (a) Define OR. **03**
 (b) Discuss the scope of OR in Indian industries. **04**
 (c) Find an initial basic feasible solution to the following transportation problem using Vogel's approximation method. **07**
- | | | | | | | |
|--------------|---|----|----|----|----|--------------|
| | | 1 | 2 | 3 | 4 | Availability |
| Origins | P | 6 | 2 | 4 | 4 | 20 |
| | Q | 3 | 4 | 4 | 5 | 25 |
| | R | 5 | 3 | 3 | 2 | 30 |
| | S | 4 | -1 | 4 | 1 | 30 |
| Requirements | | 30 | 25 | 35 | 25 | |
- Q.3** (a) What is Linear programming? **03**
 (b) Explain in short: **04**
 (i) feasible solution, (ii) basic feasible solution.
 (c) Solve the following LPP. **07**
 Minimize $10x+6y+2z$
 Subject to $-x+y+z \geq 1$
 $3x+y-z \geq 2$
 $x, y, z \geq 0$
- Q.4** (a) State the applications of Linear programming. **03**
 (b) Explain in short: **04**
 (i) optimum solution, (ii) non-degenerate feasible solution.
 (c) Prove that Dual of Dual is a primal. **07**
 Minimize $z = x_1 - 3x_2 + 2x_3$,
 Subject to $3x_1 - x_2 + 2x_3 \leq 7$,
 $-2x_1 + 4x_2 \leq 12$,
 $-4x_1 + 3x_2 + 8x_3 \leq 10$,
 $x_1, x_2, x_3 \geq 0$.
 Formulate the dual LP.
- Q.5** (a) What is degeneracy in transportation problem? **03**
 (b) How will you do optimality test in transportation problem? **04**
 (c) Solve following transportation problem for minimum transportation cost. Unit shipping costs in Rs. are given as under: **07**

Factory/Warehouse	a	b	c	d	Supply
A	8	9	6	3	18
B	6	11	5	10	20
C	3	8	7	9	18
Demand	15	16	12	13	

- Q.6** (a) State the application of assignment problem. **03**
 (b) Explain MODI method. **04**
 (c) Solve the following sequential problem by graphical and arithmetic method: **07**

Job	M	N	O	P	Q	R	S	T
Machine-A	5	4	21	16	15	10	11	5
Machine-B	7	10	13	11	20	9	5	21

- Q.7** (a) Explain 'Jockeying' in queuing. **03**
 (b) Explain the Kan DALL'S notation to represent a queuing model. **04**
 (c) Explain the following queuing model ; M/M/1_(∞/fcfs). **07**
 Given an average arrival rate =10 per hour , average service time = 4 minutes.
 Calculate the average queue length, waiting and idle time facilities.

- Q.8** (a) State the application of Game theory? **03**
 (b) Define and discuss saddle point and zero sum games. **04**
 (c) Solve the following Game: **07**

	Player Y				
	1	2	3	4	5
Player X	0	-8	-5	1	2
	1	5	8	-4	2

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