

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019

Subject Code: 2172011

Date: 03/12/2019

Subject Name: Production Optimization Techniques

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1** (a) Explain the evolution of modern management. **03**  
 (b) What do you mean by a feasible solution of an LPP? **04**  
 (c) Explain application of linear programming. **07**

- Q.2** (a) Explain how a profit maximization transportation problem can be converted to an equivalent cost minimization transportation problem. **03**  
 (b) Find the initial basic feasible solution for given problem by using least cost method: **04**

	D1	D2	D3	D4	Supply
P1	2	3	11	7	6
P2	1	0	6	1	1
P3	5	8	15	9	10
Demand	7	5	3	2	

- (c) Use the Big-M method to solve the following LPP **07**  
 Maximize  $Z=5X_1+3X_2$   
 Subject to constraints,  
 $2X_1 + 4X_2 \leq 12$ ,  $2X_1 + 2X_2 = 10$ ,  
 $5X_1 + 2X_2 \geq 10$  and  $X_1, X_2 \geq 0$ .

OR

- (c) Use the two-phase method to solve the following LPP **07**  
 Minimize  $Z=X_1+X_2$   
 Subject to constraints,  
 $2X_1 + X_2 \geq 4$ ,  $X_1 + 7X_2 \geq 7$  and  $X_1, X_2 \geq 0$ .

- Q.3** (a) What is an assignment problem? Give the applications also. **03**  
 (b) What are the methods used for solving an assignment problem? **04**  
 (c) Apply MODI method to obtain optimal solution of transportation problem: **07**

	D1	D2	D3	D4	supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	34

OR

- Q.3** (a) What is the need of Decision tree analysis? **03**  
 (b) Explain the Kendall's notation for Queuing models. **04**  
 (c) A travelling salesman has to visit five cities. He wishes to start from a particular city, visit each city once and then return to his starting point. Suggest him such that his constraint is fulfilled as well as he consumes least cost. The travelling cost of each city from a particular city is given below: **07**

	A	B	C	D	E
A	$\infty$	2	5	7	1
B	6	$\infty$	3	8	2
C	8	7	$\infty$	4	7
D	12	4	6	$\infty$	5

- Q.4 (a) At the coffee shop, the customers arrive at the average interval of 6 minutes and the average time to serve coffee per person is 5 minutes. Calculate: 03
- (1). Counter utilization level;
  - (2). Average no. of customers in the including at service system;
  - (3). Average no. of customers in queue.

(b) Discuss the various costs involved in an inventory problems. 04

(c) The following information is provided for an item: 07

Annual usage=12000, Ordering cost=Rs. 60 per order, carrying cost=10%, unit cost of item = Rs. 10, and lead time 10 days.

Find: (1) EOQ, (2) No. of order per year, (3) Average usage if there are 300 working days per year, (4) safety stock if highest usage rate is 70 units per day, (5) R. O. L., (6) Average inventory, (7) Inventory carrying cost per year.

OR

- Q.4 (a) Explain the reasons for incorporating dummy activities in a network diagram. In what way do these differ from the normal activities? 03

(b) Discuss the types of failure in the context of replacement decisions. 04

(c) Following data gives the average cost of spares per year, overhead cost of maintenance per year and the resale value of certain equipment whose purchase price is Rs. 50,000. 07

Year(n)	1	2	3	4	5
Cost of spares	10,000	12,000	14,000	15,000	17,000
Resale value	40,000	32,000	28,000	25,000	22,000
Overhead cost	5,000	5,000	6,000	6,000	8,000

Determine the optimal period for replacement.

- Q.5 (a) Discuss in brief: (1) total float, (2) free float. Also Explain their uses in network. 03

(b) Differentiate PERT & CPM. 04

(c) Find an optimal sequence for the following sequencing problems of four jobs and five machines, when passing is not allowed. Its processing time(in hour) is given below: 07

Job	Machine				
	M1	M2	M3	M4	M5
A	7	5	2	3	9
B	6	6	4	5	10
C	5	4	5	6	8
D	8	3	3	2	6

OR

- Q.5 (a) Determine given terminology from sequencing problems: (1). Number of machines, (2) Idle time on a machine, (3) Total elapsed time. 03

(b) What is EMV (expected monetary value)? How it is computed to be used a criterion of decision making and when? 04

(c) For the given activities determine: 07

- (1). Critical path using PERT
- (2). Calculate variance and standard deviation for each activity.
- (3). Calculate the probability of completing the project in 26 days.

Activity	$t_o$	$t_m$	$t_p$
1-2	6	9	12
1-3	3	4	11
2-4	2	5	14
3-4	4	6	8
3-5	1	1.5	5
2-6	5	6	7
4-6	7	8	15
5-6	1	2	3

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