

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI(NEW) – EXAMINATION – SUMMER 2019****Subject Code:2163201****Date:10/05/2019****Subject Name:Operation Research****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) Discuss the advantages of Model Building in Operations research. **03**
- (b) Use simplex method to maximize $z = 4x_1 + 3x_2$ **04**
Subject to constraints
 $2x_1 + x_2 \leq 1000, x_1 + x_2 \leq 800, x_1 \leq 400, x_2 \leq 700, x_1, x_2 \geq 0$
- (c) What are the features of Operations research approach? Discuss in brief. **07**

- Q.2** (a) Solve the following LPP graphically **03**
Minimize $Z = 600x + 400y$
Subject to $3x + 3y \geq 40, 3x + y \geq 40, 2x + 5y \geq 44, x, y \geq 0$
- (b) Explain the primal – dual relationship. **04**
- (c) Maximize $Z = 2x_1 + 3x_2 + 4x_3$ **07**
Subject to constraints
 $3x_1 + x_2 + 4x_3 \leq 600, 2x_1 + 4x_2 + 2x_3 \geq 480,$
 $2x_1 + 3x_2 + 3x_3 = 540, x_1, x_2, x_3 \geq 0$

OR

- (c) Use Two phase method to solve the following LPP **07**
Minimize $z = x_1 + x_2$
Subject to the constraints
 $2x_1 + x_2 \geq 4, x_1 + 7x_2 \geq 7, x_1, x_2 \geq 0$
- Q.3** (a) Give an algorithm for solving a transportation problem. **03**
- (b) Solve the following Assignment problem **04**

	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

- (c) Solve the transportation problem (find initial basic solution with VAM and Optimal Solution using MODI method) **07**

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

OR

- Q.3** (a) How would you solve the assignment problem where the objective function is of maximization type? **03**
- (b) Explain Degeneracy in Transportation problem and its resolution. **04**
- (c) A manufacturer wants to ship 22 loads of his product as shown below. **07**

	D1	D2	D3	D4	D5	Supply
S1	5	8	6	6	3	8
S2	4	7	7	6	5	5
S3	8	4	6	6	4	9
Demand	4	4	5	4	8	25 / 22

The shipping cost is Rs. 10 per load per km. What shipping schedule should be used in order to minimize the total transportation cost?

[Use VAM to find the initial basic feasible solution and MODI method for Optimal solution]

Q.4 (a) Draw the network diagram for following **03**

Activity	A	B	C	D	E	F	G	H
Pre. Activity	-	A	A	B	B, C	E	D, F	G

(b) What is critical activity in network diagram? What is the importance of critical path in any project? **04**

(c) Information on the activities required for a project is as follows: **07**

Activity Name	A	B	C	D	E	F	G	H	I	J	K
Activity Node	1-2	1-3	1-4	2-5	3-5	3-6	3-7	4-6	5-7	6-8	7-8
Duration (Days)	2	7	8	3	6	10	4	6	2	5	6

Find total float, free float and independent float for each activity.

OR

Q.4 (a) Define Reneging, Balking and Jockeying in Queuing System. **03**

(b) A TV repairman finds that the time spent on his job has an exponential distribution with a mean of 30 minutes. If he repairs the sets in order in which they came in, and if the arrival rate of sets follows a poisson distribution with an average rate of 10 per 8-hour a day, what is the repairman's expected idle time each day? Find the expected number of TV sets in the system. **04**

(c) The data on the running costs per year and resale price of equipment A, whose price is Rs. 2,00,000 are as follows. **07**

Year	1	2	3	4	5	6	7
Running cost	30000	38000	46000	58000	72000	90000	110000
Resale value	100000	50000	25000	12000	8000	8000	8000

What is the optimum period of replacement?

Q.5 (a) What is Random number? **03**

(b) What are the advantages of Simulation? **04**

(c) The following mortality rates have been observed for certain type of fuse: **07**

Week	1	2	3	4	5
% failing by the end of week	5	15	35	57	100

There are 1000 fuses in use and it costs Rs. 5 to replace an individual fuse. If all fuses were replaced simultaneously it would cost Rs. 1.25 per fuse. What is the optimal replacement plan?

OR

- Q.5 (a) Define Simulation. Enlist the types of simulation. **03**
- (b) Explain the Group replacement policy versus Individual replacement policy. **04**
- (c) A company trading in motor vehicle spare parts wishes to determine the levels of stock it should carry for the items in its range. The demand is not certain and there is a lead time for stock replenishment. For an item A, the following information is obtained; **07**

Demand (units/day)	3	4	5	6	7
Probability	0.1	0.2	0.3	0.3	0.1

Carrying cost: Rs. 2 /unit/ day

Ordering cost: Rs. 50/ order

Lead time for replenishment: 3 days

Stock on hand at the beginning of simulation process was 20 units

Carry out the simulation over a period of 10 days with the objective of evaluating the inventory rule: Order 15 units when present inventory plus any outstanding order falls below 15 units.

Random number: 0, 9, 1, 1, 5, 1, 8, 6, 3, 5

Your calculation should include the total cost of operating inventory rule for 10 days.

www.FirstRanker.com