

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2024

Subject Code:2171901

Date:11-12-2024

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.
4. Simple and non-programmable scientific calculators are allowed.

	MARKS
Q.1 (a) Define Operations research. Explain any two area of feasible application of OR in your college.	03
(b) Discuss various areas for the application of operations research techniques.	04
(c) A small-scale manufacturer produces two types of products A and B which give a margin of Rs.4 and Rs.3 respectively. There are two plants I and II, each having capacity of 72 and 48 hours per day. Cycles times of A and B are 2 hour and 1 hour in plant No I respectively. Similar figures for Plant No II are 1 and 2 hours. Formulate L.P. model for maximizing the profit.	07
Q.2 (a) Discuss steps of simplex method for solving Linear Programming Problem.	03
(b) Give the dual of the following LP problem. Minimize $Z=2X_1+3X_2+4X_3$ Subject to, $2 X_1+3X_2+5X_3 \geq 2$ $3 X_1+ X_2+7X_3 = 3$ $X_1+4 X_2+6X_3 \leq 5$ $X_1, X_2 \geq 0 \text{ and } X_3 \text{ is unrestricted.}$	04
(c) Solve the following problem using simplex method: Minimize $Z = x_1 - 3x_2 + 2x_3$ Subject to $3x_1 - x_2 + 3x_3 \leq 7$ $-2x_1 + 4x_2 \leq 12$ $-4x_1 + 3x_2 + 8x_3 \leq 10$ $x_1, x_2, x_3 \geq 0$	07
OR	
(c) Using Graphical method find the minimum value of Z $Z= 7x_1+3x_2$ Subject to $x_1 + 2x_2 \geq 3$ $x_1 + x_2 \leq 4$ $0 \leq x_1 \leq 5/2$ $0 \leq x_2 \leq 3/2$	07
Q.3 (a) Give mathematical model for transportation problem.	03
(b) Describe Degeneracy in Transportation Problems.	04

- (c) Solve the following Transportation Problem in which cell entries represents unit costs. 07

Available

	2	7	4	5
	3	3	1	8
	5	4	7	7
	1	6	2	14
Requirements	7	9	18	34

OR

- Q.3** (a) What is assignment problem? Show the assignment problem is special case of transportation problem. 03
- (b) How profit maximization problem can be solved by assignment Problem? 04
- (c) A Marketing manager has 5 salesmen and there are five districts. Consider the capabilities of the salesmen and the nature of the districts, the estimates made by the marketing manager for the sales per month (in 1000 rupees) for each salesman in each district would be as follow. 07

	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

Find assignment of the salesmen to the districts that will result in the maximum sales.

- Q.4.** (a) What is replacement? Describe some important replacement situations. 03
- (b) Give Objectives and limitations of Game Theory. 04
- (c) Give the Classification of Queuing Models. Explain Model II (A) Birth-Death Process. 07

OR

- Q.4.** (a) What is “Strategy”? Explain the difference between pure strategy and mixed strategy. 03
- (b) What is inventory? Discuss benefits and limitations of inventory. 04
- (c) In a tool crib following data are given: 07
 Arrival time = 1 min. Servicing time = 50 secs.
 Tool attendant/mechanics pay = Rs. 20 days. (a) Find out necessity to employ more tool attendants. (b) What is optimum number of attendants.
- Q.5** (a) Discuss various costs involved in an Inventory model. 03
- (b) Explain the Decision - Tree Analysis. 04

- (c) A small project consists of six activities for which the relevant data are given below:

07

Activity	Preceding Activities	Activity Duration (Days)
A	----	4
B	----	7
C	----	6
D	A,B	5
E	A,B	7
F	C,D,E	6
G	C,D,E	5

- (I) Draw the network and find the project completion time.
(II) Calculate total float for each of the activities.
(III) Draw the time scaled diagram.

OR

- Q.5** (a) Explain the following terms: Total Float, Independent Float
(b) Differentiate CPM & PERT.
(c) Explain the different methods useful for decision making under certainty.

03

04

07
