GUJARAT TECHNOLOGICAL UNIVERSITY
MCA – SEMESTER-V EXAMINATION –SUMMER-2020

Subject Code:4659310   **Date:07-11-2020**
Subject Name: Operation Research(OR)
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.

Q.1 **(a)** Define Terms (Any SEVEN):   **07**
        1) Slack   2) Inventory   3) PERT   4) EOQ   5) Activity
        6) Pay-off Matrix   7) Value of Game   8) Maximin and Minimax Value

     (b) What is Operations Research (OR)? Sate any four application of OR.   **07**

Q.2 **(a)** Construct the dual for following problem   **07**
$$\text{Maximize } Z = 5x_1 + 12x_2 + 4x_3$$
      Subject to
$$x_1 + 2x_2 + x_3 \le 10$$
$$2x_1 - x_2 + 3x_3 = 8$$
$$x_1, x_2, x_3 \ge 0$$

     (b) Solve the following LPP using simplex method simplex   **07**
$$\text{Maximize } Z = 3x_1 + 5x_2 + 4x_3$$
      Subject to constraints
$$2x_1 + 3x_2 \le 8$$
$$2x_2 + 5x_3 \le 10$$
$$3x_1 + 2x_2 + 4x_3 \le 15$$
$$\text{And } x_1, x_2, x_3 \ge 0$$

                          OR

     (b) Solve the following LPP using simplex method simplex   **07**
$$\text{Maximize } Z = 16x_1 + 17x_2 + 10x_3$$
      Subject to constraints
$$x_1 + x_2 + 4x_3 \le 2000$$
$$2x_1 + x_2 + x_3 \le 3600$$
$$x_1 + 2x_2 + 2x_3 \le 2400$$
$$\text{And } x_1, x_2, x_3 \ge 0$$

Q.3 (a) A department of a company has five employees with five jobs to be performed. **07**
The time (in hours) that each man takes to perform each job is given:

		Employees			
		1	2	3	4	5
	A	10	5	13	15	16
	B	3	9	18	13	6
jobs	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

How should jobs be allocated, one per employee, to minimize the total man hours?

(b) Player A and B ,each takes out 1 or 2 matches and guess how many matches **07**
opponent have taken. If one of the players guesses correctly, then the loser has to
pay him the sum of the number held by both players. Otherwise the payout is zero.
Write down the payoff matrix and obtain the optimal strategy of both players.
Also find the value of the game.

OR

Q.3 (a) Solve the following Transportation Problem using NWCM and obtain an optimal **07**
solution to minimize total shipping cost:

		Warehouses			
		W 1	W 2	W 3	Supply
	F1	16	20	12	200
Factory	F2	14	8	18	160
	F3	26	24	16	90
	Demand	180	120	150	

(b) Consider the game with the following payoff table **07**

		Player B		
Player A		B1	B2	B3
A1		14	8	18
A2		26	24	16
A3		180	120	150

(a) find the optimal strategy of both players
(b) Determine the value of the game

Q.4 (a) Discuss in detail the various types of inventories. **07**
(b) Explain the difference between pure strategy and mixed strategy used in game **07**
theory.

OR

Q.4 (a) Describe the major cost categories used in inventory analysis and their functional **07**
relationship to each other.
(b) State and define the methods of solving an Transportation problem **07**

Q.5 (a) Define Simulation. Why is Simulation used? Give one application area when this **07**
technique is used in practice.
(b) The precedence relationships of the activities, and activity time estimates (in **07**
weeks) of a project is as follows:

Jobs	A	B	C	D	E	F	G	H	I
Predecessors	-	A	B	B	C	D	C	E, F	G, H
Time	5	7	2	3	1	2	1	3	10

1. Draw the network of the project.
2. Find Critical path and critical activities and expected completion time.

OR

Q.5 (a) What is the importance of simulation? Discuss advantages and disadvantages of Simulation. **07**

(b) The precedence relationships of the activities, and activity time estimates (in weeks) of a project is as follows: **07**

Jobs	A	B	C	D	E	F	G	H	I	J
Predecessors	-	A	B	B	B	C	C	F, G	D, E, H	I
Time	14	22	10	16	12	10	6	8	24	16

1. Draw the network of the project.

2. Find Critical path and critical activities and expected completion time.

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Jobs	A	B	C	D	E	F	G	H	I	J
Predecessors	-	A	B	B	B	C	C	F, G	D, E, H	I