BA 172302

Roll No. of candidate

h/3/2021

M.B.A. 3rd Semester End-Term Examination

OPERATION RESEARCH FOR INDUSTRY

(New Regulation & New Syllabus w.e.f. 2017-2018)

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks
for the questions.

1. Answer the following questions :   (10 × 1 = 10)

    (i)   In case of minimisation problems the constraints on the primal side should have a less than equal to inequality (True/False)

    (ii) An LPP can have a unique solution when the relevant urea is unbounded (True/False)

    (iii) The process of modifying an OR model to observe the effects on its output is called sensitivity analysis. (True/False)

    (iv) An optimal solution does not necessarily use up all the limited resources available. (True/False)

    (v)   Simulation should not be applied in all cases because it provides at best, approximate results. (True/False)

    (vi) A mixed strategy game is based on the assumption that players act irrationally. (True/False)

    (vii) If all entries in a row of the cost matrix, is increased by a constant then it will affect output of the optimal solution (True/False)

    (viii) An assignment problem can be solved by transportation method. (True/False)

    (ix) Transportation problems can be solved using linear programming (True/False)

    (x)   Saddle point exists in all game theory problems (True/False)

(Answer any four)

2. (a) A brewery has two bottling plants at A and B, and each plant produced three products, whiskey, beer and brandy. The production per day (in bottles) is shown in the table

Product	Plant	
	A	B
Whiskey	1500	1500
Beer	3000	1000
Brandy	2000	5000

A survey indicates a demand of at least 20000,40000 and 44000 bottles of whiskey, beer and brandy respectively. The operating cost at A and B is 600 and 400 monetary units per day. For how many days the plants should be run to minimize the production cost while still meeting the demand Formulate an LPP and solve using graphical method. (8)

(b) Obtain the dual of the following LP problem (7)

Minimize $Z = x_1 + 3x_2$

Subject to

$2x_1 + 4x_2 \leq 160$

$x_1 - x_2 = 30$

$x_1 \geq 10$

$x_1, x_2 \geq 0$

3. (a) A pharmaceutical company has ingredients of 100, 80 and 120 kg of A,B and C respectively, available per month. These can be used to make three products 5-10-5, 5-5-10 and 20-5-10, where the numbers in each case represent the percentage weight of A,B and C respectively. The cost of the raw materials are rupees 80,20 and 50 per kg for A,B and C respectively and the cost of the base is Rs 20/kg. The selling prices of the products are 40.5, 43 and 45 rupees per kg respectively. There is a capacity restriction for product 5-10-5 to a limit of 30 kg per month. Determine how much of each product should be produced to maximize the monthly profit. (12)

(b) What are slack and surplus variables? (3)

4. (a) The following data provides the transportation cost (Rs), and demand supply of each market and warehouse.

	P	Q	R	S	Supply
A	6	3	5	4	22
B	5	9	2	7	15
C	5	7	8	6	8
Demand	7	12	17	9	45

The shipping clerk has made the following allocations. 12 units A to Q,1 unit A to R, 9 units A to S, 15 units B to R, 7 units C to P,1 unit C to R. Check if the schedule is the most optimal. If not find the most optimal schedule with the minimum transportation cost. (9)

(b) A marketing manager has 5 salesmen for 5 states. The estimated sales by each of them in each state are given in the cost matrix.

Salesman/State	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

Design the most optimal assignment for maximum profit.

5. (a) A company manufactures about 200 cycles daily. Depending on raw material availability is ranges from 196 to 204 whose probability is distribution is given below

Production/day	196	197	198	199	200	201	202	203	204
Probability	0.05	0.09	0.12	0.4	0.20	0.15	0.11	0.08	0.06

The cycles are transported on a truck that can accommodate 200 units. Using the following random numbers: 82, 89,78,24,53,61, 18,45,4,23,50,77,27,54 and 10, simulate the demand for the next 15 days. What is the average number of mopeds waiting in the factory? What are the average number of empty spaces in the truck? (12)

(b) What are the disadvantages of Simulation? (3)

6. (a) Use graphical method for solving the game and find the value of the game (10)

Player A/Player B	B1	B2	B3	B4
A1	2	2	3	1
A2	4	3	2	6

(b) Explain zero sum game with an example. (5)

7. Write short notes on (Any three) (3 × 5 = 15)
   (a) Pure Strategies and Mixed Strategies in game theory
   (b) Solving Degeneracy
   (c) Solving unbalanced Assignment problems
   (d) Integer programming
   (e) Simulation.