

OPERATIONS RESEARCH

(For students admitted in 2009, 2010, 2011, 2012 & 2013 only)

Time: 3 hours

Max. Marks: 60

Answer any FIVE questions
All questions carry equal marks

1. (a) Discuss the importance of operations research in decision making process.
(b) Use simple method to solve the following LPP
Maximize $z = x_1 + 2x_2$ subject to

$$-x_1 + 2x_2 \leq 8, \quad x_1 + 2x_2 \leq 12$$

$$x_1 - 2x_2 \leq 3; \quad x_1 \geq 0 \text{ and } x_2 \geq 0.$$
(c) Use two phase simplex method to minimize $Z = x_1 + x_2 + x_3$ subject to the constraints $x_1 - 3x_2 + 4x_3 = 5$,
 $x_1 - 2x_2 \leq 3, \quad 2x_2 - x_3 \geq 4; \quad x_1 \geq 0 \text{ and } x_2 \geq 0 \text{ and } x_3 \text{ is unrestricted.}$

2. (a) Use duality to solve the following LPP
Maximize $Z = 2x_1 + x_2$ subject to the constraints
 $x_1 + 2x_2 \leq 10, \quad x_1 + x_3 \leq 6,$
 $x_1 - x_2 \leq 2, \quad x_1 - 2x_2 \leq 1; \quad x_1, x_2 \geq 0.$
(b) Use dual simplex method to solve the LPP
Maximize $Z = -3x_1 - x_2$ subject to the constraints
 $x_1 + x_2 \geq 1, \quad 2x_1 + 3x_2 \geq 2; \quad x_1, x_2 \geq 0.$

3. (a) Use Vogel's approximation method to obtain an initial basic feasible solution of the transportation problem

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400

(b) What is an assignment problem and how do you interpret it as an L.P model?

4. (a) Find the sequence that minimizes the total elapsed time (in hours) required to complete the following tasks on two machines.

Task	A	B	C	D	E	F	G	H	I
Machine I	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

(b) Use graphic method to find the minimum elapsed total time sequence of 2 jobs and 5 machines, when we are given the following information machines.

Job I {	Sequence:	A	B	C	D	E
	Time in hours:	2	3	4	6	2

Job I {	Sequence:	C	A	D	E	B
	Time in hours:	4	5	3	2	6

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5. (a) A firm is considering replacement of a machine, whose cost price is Rs12,200 and the scrap value Rs 200. The running (maintenance and operating) costs in Rs are found from experience to be as follows.

Year:	1	2	3	4	5	6	7	8
Running Cost:	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

- (b) The initial cost of an item is Rs 15,000 and maintenance or running costs (in Rs) for different years are given below.

Year:	1	2	3	4	5	6	7
Running Cost:	2,500	3,000	4,000	5,000	6,500	8,000	10,000

6. (a) Use dynamic programming to solve the following problem.
Minimize $Z = y_1^2 + y_2^2 + y_3^2$ subject to the constraints
 $y_1 + y_2 + y_3 \geq 15$ and $y_1, y_2, y_3 \geq 0$.
- (b) What are the essential characteristics of dynamic programming problems?
7. (a) What is a game in game theory? What are the properties of a game?
(b) For the game with the following pay off matrix, determine the optimum strategies and the value of the game.
8. (a) What are the types of inventory? Why they are maintained? Explain the various costs related to inventory.
(b) A baking company sells cake by the pound. It makes a profit of 50 paise a pound on every pound sold on the day it is baked. It disposes of all cakes not sold on the date it is baked; at a loss of 12 paise a pound. If demand is known to be rectangular between 2,000 and 3,000 pounds, determine the optimum daily amount baked.
