

Total No. of Questions :12]

P1900

[4861]-23

SEAT No. :

[Total No. of Pages :6

F.Y. M.C.A. (Under Engineering Faculty)
OPERATIONS RESEARCH
(2008 Pattern) (Semester - II) (510911)

Time : 3 Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.

SECTION - I

- Q1) a)** A farm is engaged in breeding pigs. The pigs are fed on various products grown on the farm. In view of the need to ensure certain nutrient constituents it is necessary to buy two products say A and B in addition. The contents of various products, per unit, in nutrient constitutes are given in the following table: **[6]**

Nutrients	Nutrient content in Product		Minimum amount of nutrient required
	A	B	
M1	36	6	108
M2	3	12	36
M3	20	10	100

If a product A costs Rs. 20 and B Rs. 40 per unit, how much each of these two products should be bought so that total costs is minimized? Formulate the LPP and solve by graphical method.

- b)** Maximize $Z = 2X_1 + 3X_2 + 4X_3$ **[6]**

Subject to

$$3X_1 + X_2 + 6X_3 \leq 600$$

$$2X_1 + 4X_2 + 2X_3 \geq 480$$

$$2X_1 + 3X_2 + 3X_3 = 540$$

$$X_1, X_2, X_3 \geq 0$$

OR

P.T.O.

Q2) a) Solve the following linear programming problem graphically. [6]

$$\text{Maximize } Z = 4X_1 + 6X_2$$

Subject to

$$X_1 + X_2 = 5$$

$$X_1 \geq 2$$

$$X_2 \leq 4$$

$$X_1, X_2 \geq 0$$

b) Maximize $Z = 5X_1 + 6X_2 + X_3$ [6]

Subject to

$$9X_1 + 3X_2 - 2X_3 \leq 5$$

$$4X_1 + 2X_2 - X_3 \leq 2$$

$$X_1 - 4X_2 + X_3 \leq 3$$

$$X_1, X_2, X_3 \geq 0$$

Q3) a) 4 jobs A,B,C and D are to be assigned to 4 workers 1,2,3 and 4 the respective profits in rupees of these assignments is given in the following matrix. Determine the optimal assignment to maximize the profit. Calculate the maximum profit resulting from the assignment. [6]

	Jobs			
	A	B	C	D
1	21	15	19	16
2	19	16	20	20
3	10	20	18	17
4	18	17	19	20

b) Solve the following Transportation Problem by [6]

- i) Least Cost
- ii) Northwest Corner Method
- iii) VAM

Factory	Warehouse				Capacity
	W1	W2	W3	W4	
F1	21	16	25	13	11
F2	17	18	14	23	13
F3	32	27	18	41	19
Requirement	6	10	12	15	43

OR

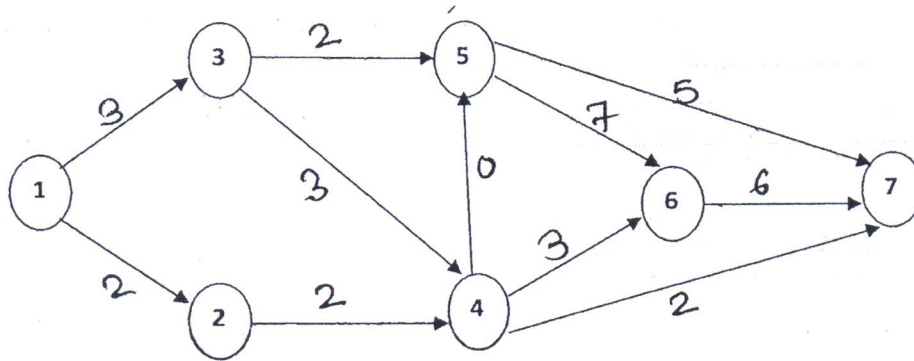
- Q4) a)** Explain Transshipment model. **[4]**
- b) For the given transportation problem find initial basic feasible solution and optimal solution. **[8]**

	D_1	D_2	D_3	D_4	Supply
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Demand	20	40	30	10	

- Q5) a)** Define the following terms: **[4]**
- i) Spanning Tree
 - ii) Total Float
 - iii) PERT
 - iv) Critical Activity

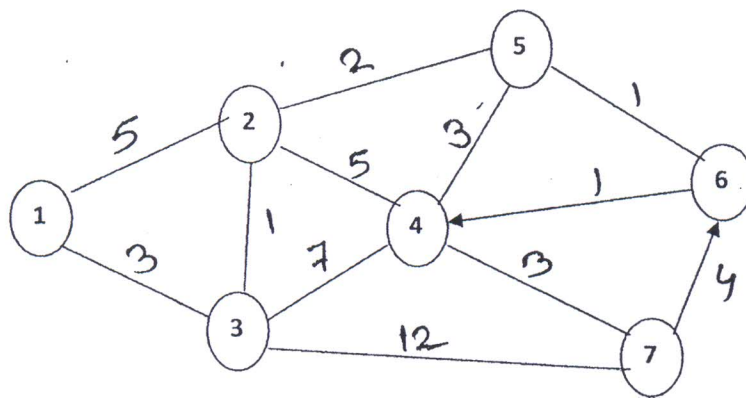
b) Determine the critical path for the given network.

[7]

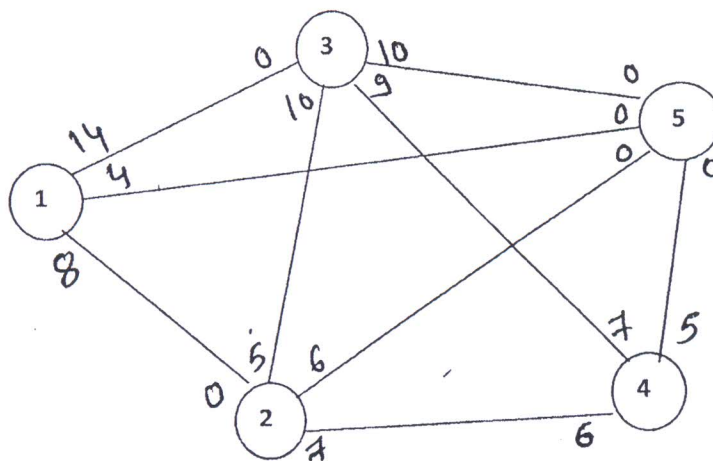


OR

Q6) a) Use Floyd's algorithm to determine the shortest route from 1 to 4. [6]



b) Determine the maximal flow and the optimum flow in each arc for the network. [5]



SECTION - II

Q7) a) Explain Cutting plane algorithm. [6]

b) Solve by using Branch and Bound [6]

$$\text{Minimize } Z = 7X_1 + 6X_2$$

Subject to

$$2X_1 + 3X_2 \leq 12$$

$$6X_1 + 5X_2 \leq 30$$

$$X_1, X_2, \geq 0$$

OR

Q8) a) Explain Moving Average Technique. [5]

b) Explain Goal Programming Problem. Explain two methods to formulate goal programming problem. [7]

Q9) a) How the Utility function quantify the decision makers attitudes towards risk. [4]

b) Analyze the decision problem using [8]

	S1	S2	S3	S4
A1	5	10	18	25
A2	8	7	12	23
A3	21	18	12	21
A4	30	22	19	15

i) Laplace

ii) Minimax

iii) Savage Regret

iv) Hurwicz

(Take $\alpha = 0.5$)

OR

- Q10)a)** What is Decision Making Under Risk. Explain expected value criterion. [6]
b) Explain decision making under certainty using AHP. [6]
- Q11)a)** What is simulation modeling? Explain Monte Carlo simulation. [5]
b) Explain the three most common methods for collecting observations in simulation. [6]

OR

- Q12)a)** Generate six random numbers based on Multiplicative Congruential method. Using $b = 17$, $c = 111$, $m = 103$, seed = 7. [6]
b) What is simulation experiments? Discuss the factors affecting simulation. [5]

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