

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 199753

Roll No.

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B. Tech.

(SEM. VII) (ODD SEM.) THEORY
EXAMINATION, 2014-15
OPERATION RESEARCH

Time : 3 Hours]

[Total Marks : 100

- 1 (a) Explain the phenomenon of infeasibility in an LP problem. What are the indicators of such a phenomenon? How can it be handled?
- (b) A pharmaceutical company produces two popular drugs A and B which are sold at the rate of Rs 9.60 and Rs 7.80 respectively. The main ingredients are x,y,z and they are required in following proportions:

Drugs	X%	Y%	Z%
A	50	30	20
B	30	30	40

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The total available quantities (gm) of different ingredients are 1,600 in x, 1,400 in y and 1,200 in z. The cost (Rs) of x, y, z per gm are Rs 8, Rs 6 and Rs 4 respectively. Estimate the most profitable quantities of A and B to produce using simplex method.

(c) The simplex tableau for a maximization problem of a linear programming is given as follows :

Product Mix	X_1	X_2	S_1	S_2	Quantity (b_j)	
C_j	X_j					
5	X_2	1	1	1	0	10
0	S_2	1	0	-1	1	3
	C_j	4	5	0	0	
	Z_j	5	5	5	0	50
	$C_j - Z_j$	-1	0	-5	0	

Answer the following question giving reasons in brief:

- (i) Is solution optimal?
- (ii) Are there more than one optimal solution?
- (iii) Is this solution degenerate?
- (iv) Is this solution feasible?

- (v) If S_1 is slack in machine A (hrs/week) and S_2 is slack in machine B (hrs/week) which of these machines is being used to full capacity when producing according to this solution
- (vi) How many units of the two products x_1 and x_2 are being produced according to this solution and what is the total profit?

- 2 (a) What is degeneracy? How does problem of degeneracy arise in transportation problem? How can we deal with this problem? Solve the following transportation problem for maximum profit :

Warehouse	Market			
	A	B	C	D
X	12	18	6	25
Y	8	7	10	18
Z	14	3	11	20

Available units at warehouses : X:200, Y:500, Z:300

Demand in market: A:180, B:320, C:100, D:400 units.

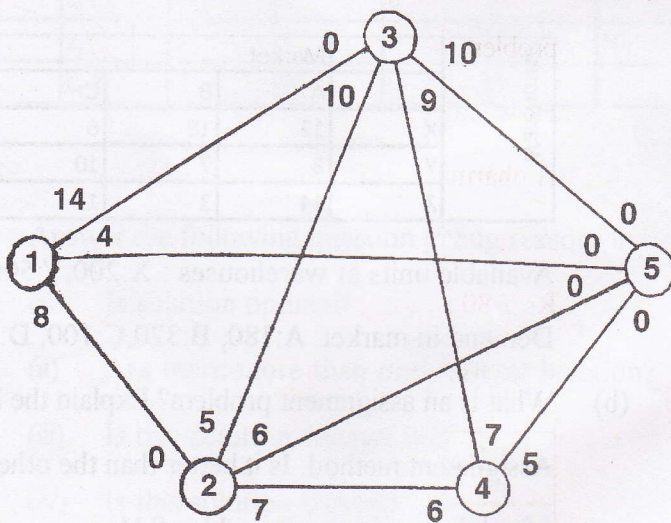
- (b) What is an assignment problem? Explain the Hungarian Assignment method. Is it better than the other methods of solving assignment problem? How.

- (c) A firm produces four products. There are four operators capable of producing them. The firm records 8 hrs a day and allows 30mins for lunch. The processing time in minutes and the profit for each of these products are given below:

Operator	Products			
	A	B	C	D
1	15	9	10	6
2	10	6	9	6
3	25	15	15	9
4	15	9	10	10
Profit /unit (Rs)	8	6	5	4

Find optimal assignment of products to operators.

- 3 (a) Determine maximal flow for the network given below using maximal flow algorithm :



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- (b) What are the major comparative characteristics of PERT and CPM model ? What are limitations if any? Discuss. A construction company has received a contract to build an office complex. It has frequently engaged itself in constructing such buildings. Which of the two network techniques PERT and CPM should in your opinion be employed by the company ?
- (c) State the rules for constructing a project network. Draw a network to the following information. Obtain the the early and late start and completion times, and determine the critical activities:

<i>Activity</i>	1-2	1-3	2-3	2-4	3-4	4-5
<i>Duration(Days)</i>	20	25	10	12	6	10

- 4 (a) Explain the following :
- (i) Saddle point
 - (ii) pure strategy
 - (iii) mixed strategy
 - (iv) Give linear programming equivalent to a game theory problem.

(b) Player A and B play a game in which each player has three coins [25p, 50p, 1Rs]. Each of them selects a coin without the knowledge of other person. If the sum of values of coin is an even number, A win's B's coin. If that sum is odd number, B wins A's coin. Develop a payoff matrix with respect to player A. Find the optimal strategies for the player.

(c) What is a "Queuing Model"? What are its objectives? Giving basic structure explain (M/M/1) model.

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5 (a) Explain in detail what constitutes ordering cost and carrying cost. Draw a rough sketch to show the movement of these two curves in opposite directions with increase in order quantity. What is reorder point? Draw a rough sketch of a simple inventory model showing reorder points, order quantity and procurement time.

(b) Explain the difference in replacement policies of items which deteriorate gradually and items which fail completely.

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(c) The following table gives the running cost per year and resale prices of certain equipment whose purchase price is Rs 5000 :

Year	1	2	3	4	5	6	7	8
Running cost(Rs)	1500	1600	1800	2100	2500	2900	3400	4000
Resale value (Rs)	3500	2500	1700	1200	800	500	300	200

In which year is the replacement due ?