



Institute of Management
JK Lakshmipat University
Jaipur



END TERM EXAMINATION Nov – Dec 2018

MBA I Sem

Course: Operations Research

MM: 50 Marks

Time: 2 hours

Subject code: ...QT 02...

Attempt any five questions. Each question carries ten marks.

1. "Statistics is the nerve centre for Operations Research". Discuss
2. What is a linear programming problem? Discuss the scope and role of Linear programming in solving management problems.
3. A Chemical company produces two chemicals namely, A and B which are sold to the manufacturers of soaps and detergents. On the basis of next month's demand, the management has decided that the total production for chemicals A and B should be at least 350 kg. Moreover a major customer's order for 125 kg of product A must also be supplied. Product A requires 2 hours of processing time per kg and product B requires one hour of processing time per kg. For the next month, 600 hours of processing time is available.
The company wants to meet the above requirements at minimum total production cost. The production costs are Rs 2 per kg for product A and Rs 3 per kg for product B. The company wants to determine its optimal product mix and the total minimum cost relevant thereto
 - (a) Formulate the above as a LPP
 - (b) Solve the problem with simplex method
 - (c) Does the problem have multiple optimal solutions? Why?
4. ABC enterprises has three plants manufacturing dry cells located at three different locations. Production cost differs from plant to plant. There are five sales offices of the company located in different regions of the country. The selling prices can differ from region to region. The shipping cost from each plant to each sales office and other information is given below:

Plant Number	Max Capacity (in num of units)	Production Cost per Unit
1	150	20
2	200	22
3	125	18

Shipping Cost (Rs)

Sales Office

Plant Location	A	B	C	D	E
1	1	1	5	9	4
2	9	7	8	3	6
3	4	5	3	2	7

Demand and Selling price

	A	B	C	D	E
Demand (units)	80	100	75	45	125
Selling Price (Rs)	30	32	31	34	29

Find out the most profitable distribution schedule for the company.

- What is an assignment problem? Is it true to say that it is a special case of the transportation problem? Explain
- How does the sequencing technique helps a manager? Draw a flow chart to show the method of solution in sequencing problems.
- On an average four patients per hour require the service of an emergency clinic. Also on an average a patient requires 10 minutes of active attention. The clinic can handle only one emergency at a time. Suppose that it costs the clinic Rs 300 per patient treated to obtain an average servicing time of 10 minutes and that each minute of decrease in the average time would cost Rs 50 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of queue from $\frac{4}{3}$ patients to $\frac{1}{2}$ patients?
- What are decision trees? How and in what type of situations are they employed for decision making?
- "When it becomes difficult to use an optimisation technique for solving a problem, one has to resort to simulation." Discuss
- "Goal programming appears to be the most appropriate, flexible and powerful quantitative technique for complex decision problems involving conflicting objectives." Discuss
- A company manufactures and sell three models of large size pressure cookers for canteen use. While market demand pose no constraints, supplies of aluminium is limited to 750kg per week and availability of machine time is limited to 600 hours per week. The resource usage of the three models and their profitability is given below:

Model

	M1	M2	M3
Aluminium/unit	6	3	5
Machine Time/unit	3	4	5
Contribution: Rs/unit	60	20	80

Formulate the problem as LPP and solve for optimal solution

12. A bank has two tellers working on savings accounts. The first teller handles withdrawals only while the second teller handles deposits. It has been found that the service time distribution of both – deposits and withdrawals are exponential with a mean service time of 3 minutes per customer. Depositors and withdrawers are found to arrive in a Poisson process throughout the day with mean arrival rate of 16 and 8 per hour respectively. What would be the effect on the average waiting time for depositors and withdrawers if each teller could handle both – withdrawals and deposits together? What would be the effect if this could only be accomplished by increasing the service time to 4 minutes?
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