

JK LAKSHMIPAT UNIVERSITY
Institute of Management
MBA End Term Examination (December, 2019)
Production Management & Operations Research
Code: OP2111

Time: Two Hr.

Marks: 40

1. A company has facilities for producing five products that require the same raw material and the same type of production, packing, and finishing facilities. The unit contribution margin and the material and labour requirement for each of the products are as given in below table:

	Product A	Product B	Product C	Product D	Product E	Availability
Raw Material (kg.)	5	5	10	15	10	100000
Labour Production Hr.	5	10	5	5	10	160000
Labour Packing Hr.	15	10	10	10	5	280000
Labour Finishing and Quality Check Hr.	6	4	3	2	1	90000
Contribution margin (Rs.)	180	150	200	200	140	

The QM for window output is shown below.

	Product A	Product B	Product C	Product D	Product E		RHS	Dual
Maximize	180	150	200	200	140			
Raw Material (kg.)	5	5	10	15	10	<=	100000	14.36
Labour Production Hr.	5	10	5	5	10	<=	160000	0.90
Labour Finishing and Quality Check Hr.	6	4	3	2	1	<=	90000	17.27
Labour Packing Hr.	15	10	10	10	5	<=	280000	0
Solution->	6363.636	12545.45	545.4545	0	0		3,136,363.63	
Variable	Value	Reduced Cost	Original Val	Lower Bound	Upper Bound			
Product A	6363.64	0	180	116.67	190			
Product B	12545.45	0	150	144.44	340			
Product C	545.45	0	200	170	225			
Product D	0	54.54546	200	-Infinity	254.55			
Product E	0	30	140	-Infinity	170			
Constraint	Dual Value	Slack/Surplus	Original Val	Lower Bound	Upper Bound			
Raw Material (kg.)	14.36	0	100000	96250	247500			
Labour Production Hr.	0.90	0	160000	83333.34	175000			
Labour Finishing and Quality Check Hr.	17.27	0	90000	66666.67	96000			

Labour Packing Hr.	0	53636.36	280000	226363.6	Infinity
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Analyze the report submitted by the Operation Department and answer the following questions:

- Suggest the optimum product mix policy to the company with appropriate recommendations. [1]
 - Comment on the important of resources of the company. [2]
 - If the company want to increase 20% raw material which have cost of Rs. 290,000. Would company increase extra raw material or not? Explain [2]
 - Would there be a change in the solution if there is a 5% increase in labour production hours. If yes than how much? [1]
 - If the manger were to attempt to secure additional units of only one of the resource, which should it be. And why? [1]
 - If the company wants to increase 1000 labour finishing hours. The cost of extra per hours on finishing and quality check is Rs. 15. What should company do increase extra labour finishing time or not? Why? [2]
 - If the contribution margin of Product D is increased by Rs. 10 per unit. Than what is total contribution margin of company? [1]
2. Consider the problem of assigning five managers to five different jobs. The assignment costs is given in the below table. [10]

		Job Cost in thousands of Rs.				
		J1	J2	J3	J4	J5
Manager	M1	10	5	13	15	16
	M2	3	9	18	3	6
	M3	10	7	2	2	2
	M4	5	----	9	7	12
	M5	7	9	10	4	12

Find the optimal assignments to minimize the cost of allocation. Find the total cost of allocation. If, the company generates revenue of Rs. 37,000 from above jobs. Than what is profit of company?

3. Alfa Industries has to decide whether to set up a large plant or a small plant for its new range of refrigerators. A large plant will cost the company Rs. 25 lakhs while a small plant will cost Rs. 12 lakhs. An extensive market survey and a cost profit volume analysis carried out by the company reveals the following: [10]

High demand probability = 0.50

Moderate demand probability = 0.30

Low demand probability = 0.20

- A large plant with high demand will yield an annual profit of Rs. 100 lakhs.
- A large plant with moderate demand will yield an annual profit of Rs. 60 lakhs.
- A large plant with low demand will lose Rs. 20 lakhs annually because of production inefficiencies.
- A small plant with high demand would yield an annual profit of Rs. 25 lakhs.
- A small plant with moderate demand will yield an annual profit of Rs. 35 lakhs.
- A small plant with low demand will yield an annual profit of Rs. 45 lakhs.

Using the decision tree approach, determine the expected return for small and large plant. Which plant would you recommend to company?

4. It is your responsibility, as the new head of the automotive section of Nichols Department Store, to ensure that reorder quantities for the various items have been correctly established. You decide to test one item and choose Michelin tyres, XW size 185 x 14 BSW. A perpetual inventory system has been used, so you examine this as well as other records and come up with the following data:

[6]

Cost per tyre	Rs 350 each
Holding Cost	20% of tyre cost per year
Demand	1,000 per year
Ordering cost	Rs. 200 per order

- Determine the order quantity and total inventory cost.
- if a Rs 50 discount on each tyre is given if order are placed in quantities of 110 or more. Should orders be placed in quantities of 110, or should you stick to the decision you made in a?

5. How multi criteria decision making work in real life? Explain. [4]