

Roll No.

Total Pages : 5

LMMS/M-24

27346

OPTIMIZATION MODELS FOR BUSINESS DECISIONS

Paper–MBA–201

Time Allowed : 3 Hours]

[Maximum Marks : 70

Note : Attempt **six** questions in all, Question No. **1** is compulsory. Attempt remaining **five** questions, out of remaining **eight** questions carrying 10 marks each.

Compulsory Question

1. Explain briefly : 5×4=20

- (a) Decision trees.
 - (b) Application of Inventory management techniques in business.
 - (c) Importance of PERT.
 - (d) Goal Programming.
 - (e) Poisson arrivals.
2. What are the Essential characteristics of Operations research? Mention different phases in an Operations research study. Point out its limitations, if any. 10

3. Solve the following LPP using the simplex method : 10

Maximize : $Z = 12x_1 + 3x_2 + x_3$

Subject to : $10x_1 + 2x_2 + x_3 \leq 100$

$7x_1 + 3x_2 + 2x_3 \leq 77$

$2x_1 + 4x_2 + x_3 \leq 80$

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0.$ 10

4. Two breakfast food manufacturers, ABC and XYZ are competing for an increased market share. The payoff matrix, shown in the following table, describes the increase in market share for ABC and decrease in market share of XYZ. 10

ABC	XYZ			
	Give Coupons	Decrease price	Maintain Strategy	Increase Advertising
Give Coupons	2	−2	4	1
Decrease Price	6	1	12	3
Maintain Strategy	−3	2	0	6
Increase Advertising	2	−3	7	1

Determine the optimal strategies for both the manufacturers and the value of the game.

5. A research and development department is developing a new power supply for a console television set. It has broken the job down into the following : $2 \times 5 = 10$

<i>Job</i>	<i>Description</i>	<i>Immediate Predecessors</i>	<i>Time (days)</i>
<i>A</i>	<i>Determine output voltages</i>	–	5
<i>B</i>	<i>Determine whether to use solid state rectifiers</i>	<i>A</i>	7
<i>C</i>	<i>Choose rectifier</i>	<i>B</i>	2
<i>D</i>	<i>Choose filters</i>	<i>B</i>	3
<i>E</i>	<i>Choose transformer</i>	<i>C</i>	1
<i>F</i>	<i>Choose chassis</i>	<i>D</i>	2
<i>G</i>	<i>Choose rectifier mounting</i>	<i>C</i>	1
<i>H</i>	<i>Layout chassis</i>	<i>E, F</i>	3
<i>I</i>	<i>Build and test</i>	<i>G, H</i>	10

(a) Draw the network diagram of activities involved in the project and indicate the critical path.

(b) What is the minimum completion time for the project?

6. A Company has three factories at Amethi, Baghpat and Gwalior that have a production capacity of 5,000, 6,000, and 2,500 tonnes, respectively. Four distribution centres

at Allahabad, Bombay, Kolkata and Delhi, require 6,000 tonnes, 4,000 tonnes, 2,000 tonnes and 1,500 tonnes, respectively, of the product. The transportation costs per tonne from different factories to different centres are given below :

10

<i>Factories</i>	<i>Distribution Centres</i>			
	<i>Allahabad</i>	<i>Bombay</i>	<i>Kolkata</i>	<i>Delhi</i>
<i>Amethi</i>	3	2	7	6
<i>Baghpat</i>	7	5	2	3
<i>Gwalior</i>	2	5	4	5

Suggest an optimum transportation schedule and find the minimum cost of transportation.

7. An Automobile dealer wishes to put four repairmen to four different jobs. The Repairmen have somewhat different kinds of Skills and they exhibit different levels of efficiency from one job to another. The dealer has estimated the number of man-hours that would be required for each job-man combination. This is given in matrix form in the following table :

10

		<i>Jobs</i>			
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
<i>Men</i>	1	5	3	2	8
	2	7	9	2	6
	3	6	4	5	7
	4	5	7	7	8

Find the Optimal assignment that will result in minimum man hours needed.

8. Sh. Sankar has ₹10,000 to invest in one of three options: A, B or C. The return on his Investment depends on whether the economy experiences inflation, recession, or no change at all. The possible returns under each economic condition are given below : 10

<i>Strategy</i>	<i>State of Nature</i>		
	<i>Inflation</i>	<i>Recession</i>	<i>No change</i>
<i>A</i>	2,000	1,200	1,500
<i>B</i>	3,000	800	1,000
<i>C</i>	2,500	1,000	1,800

What should he decide, using the pessimistic criterion, optimistic criterion, equally likely criterion and regret criterion?

9. Discuss the phases involved in developing a simulation model. Why is each phase important? Provide a detailed explanation of each phase with examples. 10