

**K. J. SOMAIYA INSTITUTE OF MANAGEMENT STUDIES AND RESEARCH,**  
**Vidyavihar, Mumbai- 400077**

**Program: PGDM- Executive, Trim-V**  
**Subject: Data Model and Decision Making**  
**(End Term Exam)**

**Maximum Marks: 25**  
**Duration: 3 hrs.**  
**2017**

**Date: 28<sup>th</sup> December,**

**Instructions**

- 1. This exam will be conducted in the computer lab. All answers are to be written in the Excel Sheet.**
- 2. Q1 is compulsory.**
- 3. Attempt any two questions out of remaining three questions.**

**QUESTION 1**

(9)

(i) A firm plans to begin production of a new appliance. The manager must decide whether to purchase the motors for the appliance from a vendor to be sold at \$7 each or to produce them in-house. Either of the two processes could be used for production. Purchasing the motor from a vendor would have an annual fixed cost of \$160,000 and variable cost of \$5 per unit, while the in-house production would have an annual fixed cost of \$190,000 and a variable cost of \$4 per unit.

- a) What is the breakeven point if we use an outside vendor?
- b) What is the breakeven point if we produce the motor in-house?

(ii) A machine operator processes five types of items on his machine each week, and must choose a sequence for them. The set-up cost per change depends on the item presently on the machine and the set-up to be made, according to the following table:

	To item				
For item	A	B	C	D	E
A	-	4	7	3	4
B	4	-	6	3	4
C	7	6	-	7	5
D	3	3	7	-	7
E	4	4	5	7	-

- a. If he processes each type of item once and only once each week, how should he sequence the item on his machine in order to minimize the total set-up cost?
- b. What action would you recommended? What profit or loss can be anticipated?

**QUESTION 2**

(8)

The management of Hartman Company is trying to determine the amount of each of two products to produce over the coming planning period. The following information concerns labor availability, labor utilization, and product profitability.

Department	Product(hours/unit)		Labor-Hours Available
	1	2	
A	1	.35	100
B	.30	.20	36
C	.20	.50	50
Profit contribution/unit	\$30	\$15	

- Develop a linear programming model of the Hartman Company problem. Solve the model to determine the optimal production quantities of products 1 and 2.
- In computing the profit per unit, management doesn't deduct labor costs because they are considered fixed for the upcoming planning period. However, suppose that overtime can be scheduled in some of the departments. Which departments would you recommended scheduling for overtime? How much would you be willing to pay per hour of overtime in each department?

**QUESTION 3**

(8)

Quality air conditioning manufactures three home air conditioners: an economy model, a standard model, and a deluxe model. The profits per unit are \$63, \$95, and \$135, respectively. The production requirements per unit are as follows:

	Number of Fans	Number of cooling coils	Manufacturing Time (hours)

Economy	1	1	8
Standard	1	2	12
Deluxe	1	4	14

For the coming production period, the company has 200 fan motors, 320 cooling coils and 2400 hours of manufacturing time available. How many economy models, standard models, and deluxe models should the company produce in order to maximize profit?

- What is the optimal solution, and what is the value of the objective function?
- Which constraints are binding?
- Which constraints are showing extra capacity? How much?
- If the profit for the deluxe model were increased to \$150 per unit, would the optimal solution change?
- Identify the range of optimality for each objective function coefficient.
- Suppose the profit for the economy model is increased by \$6 per unit, the profit for the standard model is decreased by \$2 per unit, and the profit for the deluxe model is increased by \$4 per unit. What will the new optimal solution be?
- Identify the range of feasibility for the right hand side values.
- If the number of fan motors available for production is increased by 100, will the dual price for the constraints change? Explain.

#### **QUESTION 4**

(8)

Stronghold Construction Company is interested in taking loans from banks for some of its projects P, Q, R, S, T. The rates of interest and the lending capacity differ from bank to bank. All these projects are to be completed. The relevant details are provided in the following table. Assuming the role of a consultant, advice this company as to how it should take loans so that the total interest payable will be the least.

Bank	Interest rate in percentage for					
	Project					Max. Credit
	P	Q	R	S	T	
Pvt. Bank	20	18	18	17	17	100
Nationalized Bank	16	16	16	15	16	400
Co-Operative Bank	15	15	15	13	14	250
Amount required	200	150	200	125	75	

