

Eastern University, Sri Lanka

Faculty of Commerce and Management

Final Year First Semester Examination in BCOM (Specialization in Business Economics)

Proper 2018/2019 (September 2020)

ECN 4053 Quantitative Method for Business

Answer all five (5) Questions

Time: 03 Hours

Calculator is permitted

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- i. Discuss the relationship between problem solving and decision making. (05 Marks)
- ii. Define the role of qualitative and quantitative analysis in the decision-making process through a suitable diagram. (05 Marks)
- iii. Jinanz Textiles factory is considering sewing T – shirt for children who are below 10 years old. The fixed cost for the production is Rs.100,000 and the material cost and other variable cost are Rs.150 per T– shirt. Estimated Demand is about 5000 T – shirts. Factory has decided to sell a T – shirt Rs.850.
  - a. How much is the total cost for the production?
  - b. What is the Break Even Point of the production?
  - c. What is the profit or loss can be anticipated?
  - d. What is the minimum price per T – shirt must be charged by the producer at the Break-Even Point?
  - e. If the price is decreased by Rs.100, how much profit can be anticipated and mention whether what amount of difference between the profits?

(02\*5=10 Marks)

(Total 20 Marks)

2.

- i. Briefly explain the Payoff table. (03 M)
- ii. Picoplex Technologies have developed a new manufacturing process which they believe will revolutionise the smartphone industry. They are, however, uncertain how they should go about exploiting this advance.

Initial indications of the likely success of marketing the process is 55%, 30%, 15% for “high success”, “medium success” and “probable failure”, respectively. The company has three options; they can go ahead and develop the technology themselves, licence it or sell the rights to it. The financial outcomes (in £ millions) for each option are given in the table below.

	“high success”	“medium success”	“failure”
Develop (D1)	80	40	-100
Licence (D2)	40	30	0

- a. Calculate the Expected Monetary Value for all possible decisions the company may take and hence determine the optimal decision for the company. (06 M)
  - b. Draw a decision tree to represent the company’s problem. (05 M)
- iii. If the decision maker knows nothing about the probabilities of the three states of nature, what is the recommended decision using the Optimistic, Conservative, and Minimax regret approaches? (06 M)

(Total 20 M)

3.

“Forecasting is a systematic guessing of the future course of events and it provides a basis for a planning”

- i. What is the Delphi Method? Describe its main advantages and limitations. (05 M)

ii. What is trend projection method, and why is this method often employed in economic forecasting? (05 Marks)

iii.

Week	Sales (1000s of gallons)
1	17
2	21
3	19
4	23
5	18
6	16
7	20
8	18
9	22
10	20
11	15
12	22

- a. Compute four- and five-week moving averages for the time series. (03 Marks)
- b. Compute the Mean Squared Error (MSE) four- and five-week moving averages forecast. (03 Marks)
- c. What appears to be the best number of weeks of past data to use in the moving average computation? The MSE for the three-week moving average is 10.22. (04 Marks)

**(Total 20 Marks)**

- 4.
- i. Describe the features of Linear Programming. (07 Marks)
- ii. A cooperative society of farmers has 50 hectares of land to grow two crops X and Y. The profit from crops X and Y per hectare are estimated as Rs 10,500 and Rs 9,000 respectively. To control weeds, a liquid herbicide has to be used for crops X and Y at rates of 20

litres and 10 litres per hectare. Further, no more than 800 litres of herbicide should be used in order to protect fish and wild life using a pond which collects drainage from this land. How much land should be allocated to each crop so as to maximise the total profit of the society? (Find the solution Graphically)

Choose the correct answer.

- iii. What is meant by “unboundedness” linear programming problem (1.5 Marks)  
 iv. Consider the following linear programming problem:

$$\begin{aligned} \text{Maximize} \quad & Z = 5X + 6Y \\ \text{Subject to:} \quad & 4X + 2Y \leq 420 \\ & 1X + 2Y \leq 120 \\ & \text{all variables} \geq 0 \end{aligned}$$

Which of the following points (X, Y) is feasible?

- a. (50,40)      b. (30,50)      c. (60,30)  
 d. (90,20)      e. none of the above

(1.5 Marks)

(Total 20 Marks)

5. i. Three decision makers have assessed utilities for the following decision problem (payoff in dollars)

		State of Nature		
		S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>
Decision Alternative	D <sub>1</sub>	20	50	-20
	D <sub>2</sub>	80	100	-100



The indifference probabilities are as follows.

Payoff	Indifferences probabilities (p)		
	Decision Maker A	Decision Maker B	Decision Maker C
100	1.00	1.00	1.00
80	0.95	0.70	0.90
50	0.90	0.60	0.75
20	0.70	0.45	0.60
-20	0.50	0.25	0.40
-100	0.00	0.00	0.00

- a. If  $P(s_1) = 0.25$ ,  $P(s_2) = 0.50$  and  $P(s_3) = 0.25$ , find a recommended decision for each of the three decision makers. (05 Marks)
- b. Plot the utility function for money for each decision maker. (03 Marks)
- c. Classify each decision maker as a risk avoider, risk taker, or risk neutral. (02 Marks)

ii. Suppose that two companies are the only manufacturers of a particular product; they compete against each other for market share. In planning a marketing strategy for the coming year, each company is considering three strategies designed to take market share from the other company. The three strategies, assumed to be the same for both companies, are as follows:

- Strategies 1      Increase advertising
- Strategies 2      Provide quantity discounts
- Strategies 3      Extend product warranty

The following payoff table shows the percentage gain in the market share for company A and company B.

		Company B		
		Increase advertisin g, b <sub>1</sub>	quantity discount s, b <sub>2</sub>	Extend product warranty, b <sub>3</sub>
Company A	Increase advertising, a <sub>1</sub>	4	3	2
	quantity discounts, a <sub>2</sub>	-1	4	1
	product warranty, a <sub>3</sub>	5	-2	0

- a. Using the above information find the Saddle Point and explain the value of the Game.

(10 Marks)

(Total 20 Marks)