



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2018/2019

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
COMMERCE

BMS 102: MANAGEMENT MATHEMATICS II

DATE: Monday, 25th March 2019

TIME: 2.00p.m-4.00p.m

INSTRUCTIONS:

1. Answer questions **ONE** and any other **TWO**
2. Show all your workings

QUESTION ONE (30 MARKS)

- a) A textile mill buys its raw materials from a vendor. The annual demand of the raw materials is 900 units. The ordering cost is sh.100 per order and the carrying cost is 20% of the purchase price. The purchase price per unit is sh 50. Find the following;

- | | |
|--|-----------|
| (i) Economic order quantity (EOQ) | (2 marks) |
| (ii) Total cost with respect to EOQ | (2 marks) |
| (iii) Number of orders per year | (2 marks) |
| (iv) Time between consecutive two orders | (2 marks) |
| (v) Explain two assumptions of EOQ model | (2 marks) |

- b) A market survey was conducted in four towns to find out the preference for brand A soap

	Mombasa	Nairobi	Kisumu	Nakuru
Yes	45	55	60	50
No	35	45	35	45
No opinion	5	5	5	5

- (i) What is the probability that a consumer selected at random, preferred brand A? (2 marks)
 - (ii) What is the probability that a customer preferred brand A and was from Kisumu
(2 marks)
 - (iii) What is the probability that a customer preferred brand A given that he was from Kisumu
(2 marks)
- c) W, X, and Y compete in the retail business. In the first week of the year, W had 300 customers; X had 250 customers, while Y had 300 customers. During the second week, 60 of the original customers of W transferred to X and 30 of the original customers of W

transferred to Y .similarly, in the second week, 50 of the original customers of X transferred to W with no transfers to Y and 20 of the original customers of Y transferred to W with no transfers to X.

Required;

- (i) Find the transition matrix for the switching process above (3 marks)
 - (ii) Obtain the market share for each firm in the 3rd week (3 marks)
 - (iii) Determine the steady state position for each firm (3 marks)
- d) In an economy, there are two industries A and B. The following table gives the supply and demand position in millions of shillings :

Producing industry	Purchasing industry			Final demand
		A	B	
		A	B	
	A	300	600	100
	B	400	1200	400

Required:

Find the gross output if the final demand changes to 200 million for industry A and 800 million units for industry B. (5 marks)

QUESTION TWO (20 MARKS)

- a) State and explain the three different environments in which decisions are made. (6 marks)
- b) The table below represent the pay offs appropriate to the various situation of a given company.

state of nature (demand)	Decision marker's alternatives			
		Expand	Build	Subcontract
	High	500,000	700,000	300,000
	Moderate	250,000	300,000	150,000
	Low	-250,000	- 400,000	-10,000
	Failure	- 450,000	-800,000	-100,000

Advice using the decision alternative that a person can make under;-

- (i) The maximax criterion (2 marks)

- (ii) The maximin criterion (2 marks)
- (iii) Laplace criterion (2 marks)
- (iv) The minimax regret criterion (4 marks)
- (v) The expected opportunity loss (2 marks)
- (vi) Suppose a person feels fairly optimistic and assigns a value of 0.7 to α advice the person on the realism criterion (2 marks)

QUESTION THREE (20 MARKS)

- a) Dimensions Ltd makes two products, tables and chairs which must be processed through assembly and finishing departments. Assembly has 60 hours available per week, finishing can handle up to 48 hours of work per week. Manufacturing one table requires 4 hours in assembly and 2 hours in finishing. Each chair requires 2 hours in assembly and 4 hours in finishing. Profit is 8 per table and 6 per chair.
- (i) Formulate the above into linear programming (4 marks)
 - (ii) Determine the best possible combination of tables and chairs to produce and sell in order to realize the maximum profit (6 marks)
- b) Annual demand for an item is 8,000 units. Ordering cost is sh 180 per order. Inventory carrying cost is 10% of the average inventory value.

The item can be purchased according to the following schedule:

<u>Quantity</u>	<u>unit price (sh)</u>
1-999	22.00
1000-1499	20.00
1500-1999	19.00
2000 and above	18.50

Required: Determine the best order size. (10 marks)

QUESTION FOUR (20 MARKS)

The economy of a certain country in West Africa can be segmented into three sectors namely: Agricultural (A), Manufacturing (M) and Services (S). In the last period, the following input-output relationships in billions of shillings were recorded;

INPUT AND OUTPUT TABLE

	User				Final demand
		A	M	S	
Producer	A	20	60	12	8
	M	30	15	36	69
	S	20	30	24	46

Required

- The technical coefficient matrix, A for the economy (3marks)
- The minor matrix M of matrix (I - A) is;

$$M = \begin{bmatrix} 0.66 & -0.30 & 0.24 \\ -0.34 & 0.62 & -0.24 \\ 0.21 & -0.27 & 0.60 \end{bmatrix}$$

Required:

Suppose the final demand in the current planning period changes to the following;

A = sh. 20 billion

M = sh. 60 billion

S = sh. 40 billion

- Determine the output levels in billions of shillings for each sector so that both intersectoral demand and final demand can be met in the current period (8 marks)
- Determine the intersectoral demand amounts for the output levels in (i) above (6 marks)
- Give detailed breakdown of usage of sector A output for production level in (i) above (3 marks)
- Give a detailed breakdown of sources of sector M input (3 marks)