

CHUKA

UNIVERSITY



UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF
COMMERCE

BCOM 162: BUSINESS MATHEMATICS II

STREAMS: BCOM (Y1S2) (ODEL)

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 07/08/2024

8.30 A.M. – 10.30 A.M.

INSTRUCTIONS

- Answer question ONE and any other two questions
- Do not write on the question paper

QUESTION ONE

- a) Distinguish between the following concepts as applied in probability theory
- Equiprobable events and Dependent events (3 marks)
 - Sample point and Sample space (3 marks)
- b) The total revenue and total cost functions for a product in Daima Ltd are $TR = 250q - q^2$ and $TC = -500 + 31q^2 + 10q$ respectively where q is the number of units produced and sold.
- Required:
- Determine the revenue maximization sales level (3 marks)
 - At what level will profit be maximized? (3 marks)
 - What will be price per unit at the profit maximization level? (3 marks)
- c) Rununu Ltd is a leading dealer of mobile phones in Busia town. The phones in stock comprise of 25% Samsung, 35% tecno and 40% Huawei. Based on past experience 6% of Samsung, 8% of tecno and 2% of Huawei customers are dissatisfied with their

purchases as a result of defects before the expiry of the warrant period. A random set of phone was sold in a particular day.

Required:

- i) A probability tree diagram presenting the joint probabilities (3 marks)
 - ii) Probability that a phone customer was dissatisfied with a phone purchase (3 marks)
 - iii) The probability that the sold mobile phone was from Huawei given that it is defective (3 marks)
- d) Use crammers rule to solve the following system of simultaneous equations
- $$2x + 4y - 3z = 12$$
- $$3x - 5y + 2z = 13$$
- $$-x + 3y + 2z = 17$$
- (6 marks)

QUESTION TWO

- a) Discuss three types of environments in a contemporary decision making process (6 marks)
- b) The demand function of a product is in XYZ ltd is $P = 8000 - 12q^2$ and the marginal cost for the product is $MC = 24q + 1000$ where q is the number of units produced and sold. Determine the profit maximization level (5 Marks)
- c) Fanaka ltd has specialised in production and sale of two products, A and B whose production is interdependent. The products' unit of measurement is metric tonnes. Based on engineering analysis, to produce one unit of A output one would require 0.3 units of A itself and 0.2 units of B while producing a unit of B output would require 0.2 units of A and 0.3 units of B itself. The company has received an external order of 1000 and 1200 metric tonnes of A and B respectively

Required:

- i) Determine the matrix of technical coefficients (2 marks)
- ii) Determine the gross production for each product so as to satisfy both the intermediate and the final demand (7 marks)

QUESTION THREE

- a) Define the following concepts as applied in matrix theory
 - i) Identity matrix (2 marks)
 - ii) Square matrix (2 marks)
 - iii) Singular matrix (2 marks)

- b) The total cost and total demand functions for a particular product are:

$TC = 5,000,000 - 250q + 0.002q^2$ and $p = 1,250 - 0.005q$ where q is the quantity produced and sold. Determine:

- (i) The total revenue function for the product (2 marks)
- (ii) The production level at which profit would be maximum (5 marks)
- (iii) Price per unit at the maximum profit (2 marks)

- c) Maridadi bakers produces two types of cakes; Queencake and Blackforest. The cost of baking 130 Queencakes and 104 blackforests is sh. 52780 while that of 52 Queencakes and 91 Blackforests is 36920. Using matrix algebra, determine the cost of producing a Queencake and a Blackforest (5 marks)

QUESTION FOUR

- a) The marketing department for the company has worked out payoffs (in sh.000) in terms of yearly net profits for each of its strategies S_1 , S_2 and S_3 under the three states of nature Boom, Normal and Recession with probabilities 0.1, 0.7 and 0.2 respectively.

	Strategies		
States of Nature	S_1	S_2	S_3
Boom	25	-10	-125
Normal	400	440	400
Recession	650	740	750

Required:

Which strategy would you have selected based on;

- (i) Maximin criterion (3 marks)
- (ii) Hurwicz criterion ($\alpha = 0.8$) (3 marks)
- (iii) Expected Monetary Value (3 marks)
- (iv) Savage principle (3 marks)

- b) The average cost of a function is given by $AC = 0.006q^2 + 0.02q - 30 + \frac{500}{q}$

where q is the output.

- (i) Find the total cost function (2 marks)
- (ii) Find the marginal cost function (2 marks)
- (iii) Determine the marginal cost when 50 units are produced (2 marks)

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