

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

RESIT/SPECIAL EXAMINATION

EXAMINATION FOR THE AWARD OF DIPLOMA IN PROCUREMENT AND LOGISTICS MANAGEMENT/ DIPLOMA IN ACCOUNTANCY AND DIPLOMA IN BUSINESS MANAGEMENT

DIBM 0121: BUSINESS MATHEMATICS 1

STREAMS: DIPLOMA

TIME: 2 HOURS

DAY/DATE: TUESDAY 29/08/2023

8.30 A.M – 10.30 A.M.

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**INSTRUCTIONS:**

- Answer Question ONE and any other TWO questions

**QUESTION ONE (30 MARKS)**

- (a) Explain the role of business mathematics in decision making process of management (5 marks)
- (b) Safaricom Ltd. Surveyed 400 of its customers to determine the way they learned about the new Platinum tariff. The survey showed that 180 learned about the tariff through Radio, 190 through Television, 190 through Newspapers, 80 through radio and TV, 90 through radio and Newspapers, 50 through TV and Newspapers, and 30 through all the three forms of media.
- (i) Represent the above information using a Venn diagram (4 marks)

Find the number of customers:

- (ii) Who learned about the tariff from at least two of the three forms of media (3 marks)
- (iii) Who learned about the tariff through exactly one of the three forms of media (3 marks)
- (iv) Who did not learn about the tariff from any of the three forms of media (3 marks)

(c) A manufacturer sells a product for Sh.10 per unit. The manufacturer's fixed costs are Sh.1200 per month, and the variable costs are Sh.2.50 per unit. Let  $x$  represent the number of units produced and sold.

- (i) Write down the Revenue function (2 marks)
- (ii) The total cost functions (2 marks)
- (iii) How many units must the manufacturer produce each month to break even? (3Marks)

d) What is the value of an annuity at the end of 5 years if 13000 is deposited into an account earning 9% compounded annually? How much of this value is interest (5mks)

**QUESTION TWO (20 MARKS)**

(a) Explain the meaning of the following pair of terms as used in business mathematics

- (i) Finite set (2 marks)
- (ii) Marginal Cost (2 mark)
- (iii) Market Equilibrium (2 mark)
- (iv) Annuity due (2 mark)
- (v) Break even point

(b) The demand function for a certain product is given by  $P = 100e^{0.5Q}$  where  $P$  is the price per unit (in Sh.) when  $Q$  units are sold. Suppose the total cost function is given by  $TC = 400Q$

- (i) What quantity of the product (to the nearest whole number) will guarantee a price of sh.2000 (3 marks)
- ii) What is the price of the product ( to the nearest whole number) if 5 units are sold (2 marks)
- iii) Calculate the break even quantity (to 1d.p) and Price for the product at that point (3 marks)

c) Given that the supply function of an item is  $P = 5000 - 10Q$  while the demand function is defined by  $P + 4000 = 5Q$ . Determine quantity at which market equilibrium occurs and the equilibrium price. (4 marks)

**QUESTION THREE (20 MARKS)**

(a) Distinguish between a permutation and a combination (4 marks)

(b) If a group consist of 8 men and 6 women, in how many ways can a committee of 5 be selected if:

- i. The committee is to consist of 3 men and 2 women. (2 marks)
- ii. There are no restrictions on the number of men and women on the committee. (2 marks)
- iii. There must at least one man. (2 marks)

c) A firm produces Energy saving Jikos and sells them for Sh. 2500 each. The fixed production cost is Sh. 400,000 plus Sh.500 for every Jiko produced and sold. Take  $Q$  as the as the number of Jikos produced and sold and assume that the total cost and total revenue functions are linear. Required:

- i) Write down the Revenue function (2 marks)
- ii) Write down the total cost function (2 marks)

iii) Determine the level of output at which total revenue will be equal to total cost.

(2 marks)

d) At what compound interest rate will sh. 400,000 grow to sh. 650,000 after 4 years. If the compounding is done semiannually.

(4 marks)

**QUESTION FOUR (20 MARKS)**

a) Solve the following simultaneous equation

$$-2x - y = 4$$

$$4x - 2y = 4$$

[4 marks]

(a) The daily demand function for a product is  $P = 300 - 2Q$  while the total cost function for producing the product is given by  $C = 2Q^2 + 10Q$  where P is the price per unit and Q is the number of units produced and sold.

Required:

(i) Determine the profit function

(3 marks)

(ii) The level of sales (in units) at which profit is zero

(4 marks)

c) For the universal set  $T = \{1, 2, 3, 4, 5\}$  and its subset  $A = \{2, 3\}$  and  $B = \{2, 5\}$

Find i)  $A^c$

(2 marks)

ii)  $A \cap B$

(2 marks)

d) Expand  $(2 - x)^4$  upto the 5th term and use the expansion to evaluate  $(1.986)^4$  [5 marks]

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