

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DIPLOMA IN ACCOUNTING,
PROCUREMENT AND LOGISTICS MANAGEMENT AND DIPLOMA IN BUSINESS
MANAGEMENT**

DIBM 0121: BUSINESS MATHEMATICS I

STREAMS: DIBM, DPLM & ACC. (Y1S1)

TIME: 2 HOURS

DAY/DATE: TUESDAY 07/08/2018

2.30 P.M. – 4.30 P.M.

INSTRUCTIONS:

- Answer questions **ONE** and any other **TWO** questions.
- Clearly show your working

QUESTION ONE

- (a) Discuss the role of business mathematics in business and project management. (4 marks)
- (b) Define the following terms as used in set theory giving an example in each case.
- (i) Universal set (2 marks)
- (ii) Infinite set (2 marks)
- (iii) Union of a set (2 marks)
- (c) Toyota Motor Corporation, a leading automobile distributor in Kenya, carried out a research on its Kenyan customers preference of its three brands. Hino (H), Lexus (L) and Rans (R). The research was based on a sample of 1,000 customers and their responses were as follows.

320 customer prefer Hino brand
200 customers prefer lexus brand
450 customer prefer Ranz brand
150 customers prefer Hino and Ranz brands
70 customer prefer Hino Lexus brands
100 customers prefer Lexus and Ranz brands
300 customers prefer none of the three brands

- Required:**
- (i) Present the above information on a venn diagram clearly showing your workings. (2 marks)
- (ii) Determine the number of customers whose preference was on exactly one brand. (2 marks)
- (iii) Determine the number of customers whose preference was on at least two brands. (2 marks)
- (d) Solve the following pair of equations by elimination method.

$$x + y = 200,000$$

$$0.09x + 0.08y = 17,200$$

(4 marks)

- (e) The demand function of tomatoes in a certain restaurant is given by $P = 5000 \cdot 3^{\frac{-t}{2}}$

Where t is the number of crates of tomatoes demanded in a day and P is the price per crate in Ksh.

Required:

- (i) At what price per crate will the demand of tomatoes be 4 crates per day? (2 marks)
- (ii) How many crates to the nearest units will be demanded if the price is Ksh. 300 per crate? (3 marks)

- (f) Given that $Z = 4x^2 + 3x^2y - 10$ find $\frac{\partial Z}{\partial x}$ (2 marks)

QUESTION TWO

- (a) Mashemeji Ltd has a fixed production cost of Sh. 400 and a variable cost of $(\frac{3}{4}x + 1460)$ shillings per unit where x is the total number of units produced and sold. Given that the selling price per unit is $(1500 - \frac{1}{4}x)$ shillings determine;

- (i) The total revenue function (2 marks)

- (ii) The total cost function (2 marks)
- (iii) The number of units to be produced and sold to break-even (5 marks)
- (b) Given that $A = \{a, b, c, d, e\}, B = \{a, f, g, h\} \wedge C = \{g, h, k\}$ find
- (i) $A \cap B \cup C$ (2 marks)
- (ii) $A \cap B \cap C$ (2 marks)
- (c) Simply $\left[\frac{x^{-8}}{x^{-4}} \right] x^4$ (2 marks)
- (d) Solve $20x^2 + 17x + 50 = 0$ by quadratic formula. (5 marks)

QUESTION THREE

- (a) You are the financial advisor to Mishumaa Ltd, a company that deals with manufacture of candles. The total revenue function is given by $TR = 400Q - 4Q^2$ while the total cost function is $TC = Q^2 + 10Q + 30$ where Q the number of candles is sold. The company is able to sell all its manufactured candles in a year. If Mishumaa Ltd objective is to maximize its profit levels determine:
- (i) The number of candles to be sold so as to maximize the company profits. (4 marks)
- (ii) Price per candle at the maximized profit. (3 marks)
- (iii) The amount of profit to be realized. (3 marks)
- (b) Solve for x given that $\log_2(x+4) = -2 - \log_2 x$ (3 marks)
- (c) Find the equation of a line perpendicular to $4y = 3x - 2$ and passes through a point (2, 0) (3 marks)
- (d) Solve by substitution method
- $$\begin{aligned} 4a + 3b &= 11 \\ 2a + 5b &= -1 \end{aligned}$$
- (4 marks)

QUESTION FOUR

(a) At Mahesabu Ltd the cost in Ksh '000' incurred in manufacturing Q hundred calculators is given by k which is a function of Q

Given that $\frac{dk}{dQ} = 2Q - 50$ and $k = 100$ when $Q = 30$

- (i) Find the fixed cost of manufacturing the calculators. (3 marks)
- (ii) Determine the value of Q that would minimize the manufacturing cost. (3 marks)
- (iii) Hence or otherwise determine the minimum manufacturing cost achieved by the company. (2 marks)
- (b) (i) Use binomial theorem to expand $(2-x)^6$ upto the 5th term. (3 marks)
- (ii) Hence or otherwise evaluate $(1.96)^6$ (2 marks)
- (c) Given that $f(x) = 2x^3 + 1$ and $g(x) = x^2$ find $(g \circ f)(x)$ (2 marks)
- (d) Differentiate $\frac{x^3 - 3x^2 + 2}{x^2 - 4}$ with respect to x (3 marks)
- (e) Distinguish between rational and irrational numbers. (2 marks)
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