

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

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

DIBM 0121: BUSINESS MATHEMATICS I**STREAMS:****TIME:2 HOURS****DAY/DATE: THURSDAY 13/04/2023****11.30 A.M. –1.30 P.M.****INSTRUCTIONS**

Answer question ONE and other TWO questions

Do not write on the question paper

QUESTION ONE (30 MARKS)

- a) Explain any four areas of application of business mathematics in management of commercial enterprises (4 marks)
- b) Define the following sets as applied in set theory;
- i. Universal set (2 marks)
 - ii. Null set (2 marks)
 - iii. Infinite set (2 marks)
- c) The revenue function of a new product is given by $TR = 5q^2 + 39q$ and its cost function is given by $TC = 4q + 30$ where q is the number of units produced and sold;

Required:

- i. Formulate the profit function (3 marks)
 - ii. Determine the breakeven sales volume (4 marks)
- d) ABC company manufacturers make two products namely; X and Y. The cost of making 15 units of product X and 10 units of product Y is Ksh. 6, 000. The cost of making 5 unit of X

and 8 units of product Y is Ksh. 3, 400. Find the cost of making one unit of product X and one unit of product Y (5 marks)

- e) Mzalendo Bank provide low cost retail lending services to its clients. Wanuna intends to borrow a loan of sh 240, 000 at the prevailing interest rate of 12% per annum on reducing balance. The loan is to be repaid in 5 equal annual instalments. Determine;
- The annual instalments payable (3 marks)
 - Prepare the respective loan amortization schedule that would guide Wanuna in loan repayment (5 marks)

QUESTION TWO (20 MARKS)

- a) The resale value $V = 250000\rho^{-0.06t}$ of a piece of industrial equipment has been found to behave according to the function where t = years since original purchase.

Required:

- Determine the initial value of the piece of equipment (2 marks)
 - What is the expected resale value after 5 years? (4 marks)
- b) A portfolio management expert is considering 30 projects for investment. Only 15 projects will be selected for inclusion in a portfolio. How many different combinations of stock can be considered? (3 marks)
- c) Let a universal set U defined as $U = \{a, b, c, d, e, f, g\}$ and further $A = \{a, b, d, g\}$, $B = \{d, a, b, c\}$ and $C = \{e, g\}$. Determine
- $(A \cap B)$ (2 marks)
 - $(A - C)$ (2 marks)
 - $(A \cup B)^c$ (2 marks)
 - $n(A \cup B \cup C)$ (2 marks)
- d) Haji deposited sh. 40000 into a fixed deposit account at an interest rate of 15% per annum compounded quarterly. Determine the accumulated amount at the end of the fifth year. (3 marks)

QUESTION THREE (20 MARKS)

- a) A manufacturing company produce and sells tables. The cost function is given by $TC = 4x + 120\sqrt{x} + 4000$ where x is the number of tables. The tables are sold for sh. 200 each. Determine:
- The total cost of producing 25 tables (2 marks)

- ii. The total profit from producing and selling the 25 tables (3 marks)
- b) Madela Café serve breakfast with 3 types of drinks being provided; Coffee, Milo and Soya. A survey involving 200 customers was carried out to determine customers' preference on its three drinks. The results obtained were as follows. A total of 52, 36 and 96 customers preferred Coffee, Milo and Soya respectively. 6 customers preferred coffee and Milo, 6 preferred Milo and Soya and 16 customers preferred coffee and Soya drinks. 48 customers preferred none of the three drinks.

Required:

- i. Present the above information on a venn diagram (3 marks)
- ii. Determine the number of customers whose preference was on all the three drinks (3 marks)
- iii. How many households preferred at most 2 drinks (2 marks)
- iv. How many households preferred Soya but not coffee drinks (2 marks)
- c) Use the binomial theorem to find the first five terms in ascending powers of x of $(2 - \frac{x}{4})^5$ hence use the expansion to estimate the value of $(0.88)^5$ (5 marks)

QUESTION FOUR (20 MARKS)

- a) ABC Ltd manufacture its products at a cost of sh. 4 per unit and sells them for sh. 10 per unit. If the firm's fixed cost is sh. 12, 000 per month:
- i. Determine the cost function? (2 marks)
- ii. Determine the revenue function (1 mark)
- iii. At what production and sales level will the firm break-even? (3 marks)
- b) Caren has been saving sh. 50, 000 at the start of each year to facilitate her plan to buy a car in the near future. The prevailing market compound interest rate is 12% per annum. Determine the total amount available for withdrawal from her savings account after 10 years (5 marks)
- c) A clothes dealer sold 3 shirts and 2 trousers for Ksh. 840 and 4 shirts and 5 trousers for Kshs. 1680. Formulate the respective simultaneous equations and hence determine the cost of a shirt and a trouser (3 marks)
- d) A committee of 4 members is to be formed from among 4 students, 2 lecturers and the Vice chancellor. In how many ways can the panel be constituted if:

- i. No restriction on who is to be included among the 7 members (2 marks)
- ii. The Vice chancellor must be included (2 marks)
- iii. The Vice chancellor and atleast 2 registrars must be included (2 marks)