

TECHNICAL UNIVERSITY OF MOMBASA
SCHOOL OF BUSINESS STUDIES
DEPARTMENT OF FINANCE AND ACCOUNTING
BACHELOR OF COMMERCE
(Y1S2)

UNIT NAME: BMS 4101

SUBJECT: MANAGEMENT MATHEMATICS I

INSTRUCTIONS

- This paper consists of section A and B
- Section A is compulsory and any TWO questions in section B.
- Mobile phones are not allowed in the examination room.
- Cheating leads to disqualification.

QUESTION ONE

(a) Write brief notes on

- (i) Universal set
- (ii) Subset
- (iii) Notation and meaning of intersection of two sets A and B. (6 marks)

(b) If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$
 $A = \{1, 4, 6, 8, 11, 12\}$
 $B = \{3, 4, 8, 11, 13\}$

What is

- (i) $A \cup B$
- (ii) $A \cap B$
- (iii) A'
- (iv) B' (4 marks)

(c) Solve the following quadratic equations.

- (i) $5x^2 - x - 4$ (3 marks)
- (ii) $6x^2 - x - 5$ (3 marks)

- (d) A company sets up a sinking fund and invests shs.30,000 each year for 5 years at 9% compound interest. What will the fund be worth after 5 years? (3 marks)
- (e) Calculate the rate of interest when shs.24,000 investment now provides a perpetual annuity of shs.1600 p.a. (2 marks)
- (f) Edwin bores a hole 250m deep. Estimate the cost of boring if the cost is shs.80 for drilling the first metre with an increase in cost of shs.5 per metre for each succeeding metre. (2 marks)
- (h) In a survey of 136 students it was found that 50 did Maths (M), 52 did Biology (B) and 52 did Physics (P). Additionally 18 did both M and P, 16 did both B and P, 22 did both M and B, and 16 did none of the three subjects.
- (i) Calculate the number of students who did all the three units. (2 marks)
- (ii) The number of students who did precisely one unit: (2 marks)
- (iii) A suitable Venn diagram to show the correct number of students in each of the regions. (2 marks)
- Q.2 (a) Sketch the logarithmic function:
 $y = 5 - 3\ln(x+1)$ (3 marks)
- (b) Determine straight line which has slope $b = -6$ and goes through $(x,y) = (15,20)$. (3marks)
- (c) Calculate how much money should be invested now in order to acquire shs.144,000 after six years if the investment rate is 12%. (4 marks)
- (d) The starting salary of a certain employee at Safaricom Ltd is 72,000 per annum. The annual increment is shs.2000 per annum.
- (i) Calculate the salary at the end of the 6th year. (3 marks)
- (ii) Calculate total earnings over this period. (3 marks)
- Q.3 (a) A commodity has linear demand and function going through the following points.
- i) When price $P = \text{Ksh.}12,000$, quantity demanded $q = 1200$.
 When price $P = \text{Kshs.}6,000$, quantity demanded $q = 900$ (4 marks)
- ii) When price = $\text{Kshs.}3,000$, quantity demanded $q = 100$
 When price $P = \text{Kshs.}1,800$, quantity demanded $q = 200$ (4 marks)

Required:

Obtain Linear function that goes through the points given in (i) and (ii) and explain which is the supply and which is the demand function.

(b) Solve the following quadratic function by formular: (3 marks)
$$6q^2 + 20q - 12 = 0$$

(c) Solve the equation: (3 marks)
$$-x^2 + 6x - 9$$
$$-x^2 + 3x + 3x$$

(d) Solve the following equation (4 marks)
$$2^{x+1} = 3^{2x} - 5$$

(e) Calculate the present value of a perpetual annuity of shs 24,000 at 12%. (3mark)

Q.4 (a) The value of ABC Ltd's property can be described by the function.

$$C(t) = 1,800,000e^{0.08t}$$

Where C(t) is value in shillings and t is the time in years.

Required:

(i) Compute the total gain in value of the property between the 3rd and 6th year. (6 marks)

(b) In an arithmetic sequence, the first term is 3 and the common difference is 5.

(i) Find the 8th term of the sequence. (3marks)

(ii) Find the sum of the first 15 terms of the sequence. (4 marks)

(c) Solve the following simultaneous equation.

$$2y + 4x = 30$$

$$y + x = 9$$

(3 marks)

Q.5 (a) Determine the sum of the first 9 terms of the geometric progression 1, 4, 16, 64, 256 -----.

$$a = 1$$

$$r = 4$$

$$n = 9$$

(3 marks)

(b) In a survey of 60 people, it was found that 25 read Newsweek magazine, 26 read time and 26 read fortune. Additionally 9 read both Newsweek and Fortune, 11 read both Newsweek and Time, 8 read both Time and Fortune and 8 read no magazine at all. Determine

- (i) The number of people who read all the three magazines. (3 marks)
- (ii) Venn diagram. (3 marks)
- (c) What is the straight line which has a slope $b = 12$ and goes through $(x,y) = (16,28)$. (3 marks)
- (d) Solve the functions
- (i) $3x^2 - 7x + 2 = 0$ (3 marks)
- (ii) $4x^2 - 4x - 3 = 0$ (3 marks)