



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF COMMERCE

BMS 100: MANAGEMENT MATHEMATICS I

DATE: Tuesday 29th November 2016

TIME: 2.00p.m - 4.00p.m

INSTRUCTIONS:

Question **One** Is Compulsory

Attempt any other **TWO** questions

TIME: 2 HOURS

Question One (30 marks)

a) Using the set builder notation define the following terms

- i) Disjoint sets (1 Mark)
- ii) Difference of sets (1 Mark)

b) Differentiate the following functions

- i) $x^2 + xy^2 + y^3 = 4$ (3 Marks)
- ii) $y = (2x + 5)^3$ (4 Marks)

c) Obtain the following integrals

- i) $xe^x dx$ (4 Marks)
- ii) $2(x + 3)^4 dx$ (4 Marks)

d) Express $2\log_a(x^3 + x) - \log_a(8y) + \frac{1}{2}\log_a(z^3 + 3)$ as one logarithm. (3 marks)

e) Given that $\bar{U} = \{1, 2, 3, 4, 5, 6, 7, 8\}$, $A = \{1, 2, 6, 7\}$, $B = \{2, 3, 4, 7\}$ and $C = \{4, 5, 6, 7\}$. Find

- i. $A \cap B$ (2 Marks)
- ii. $A \cup B \cup C'$ (2 Marks)

f) Find the number of terms in the series $8 + 24 + 72 + \dots$ that adds up to 1 million. (4 Marks)

Question Two (20 marks)

a) Draw the Venn diagrams for the sets

i) $A \cap B \cup \bar{C}$

(3Marks)

ii) $A - (B \cup C)$

(3 Marks)

b) CompKENYA has recorded recent sales for three types of computer software: games, educational software, and utility programs. The following information regarding software purchases was obtained from a survey of 893 customers.

545 purchased games.

497 purchased educational software.

290 purchased utility programs.

297 purchased games and educational software.

196 purchased educational software and utility programs.

205 purchased games and utility programs.

157 purchased all three types of software.

Use a Venn diagram to answer the following questions. How many customers purchased

i) None of these types of software?

(3 marks)

ii) Only games?

(3 marks)

iii) At least one of these types of software?

(4 marks)

iv) Exactly two of these types of software?

(4 marks)

Question Three (20 Marks)

a) John inherited Ksh 25,000 and invested part of it in a money market account, part in municipal bonds, and part in a mutual fund. After one year, he received a total of Ks 1,620 in simple interest from the three investments. The money market paid 6% annually, the bonds paid 7% annually, and the mutually fund paid 8% annually. There was Ksh6,000 more invested in the bonds than the mutual funds. Find the amount John invested in each category

(8 marks)

b) A manufacturer makes two products i.e. product Q and Product M. The cost of making 15 units of Product Q and 10 units of product M is shs 600. The cost of making 5 units of product Q and 8 units of product M is shs 340. The manufacturer makes a profit of 20% and 25% on each unit of product Q and product M, respectively.

i) Formulate a system of simultaneous equations to represent this information and solve the equations to determine the cost of making one unit of product Q and product M.

(4 Marks)

ii) Calculate the selling price of one unit of product Q and product M.

(2 Marks)

c) Miss Kamau invested Ksh. 30,000, one part at 5% and another part at 8%. The total interest on the investment was Ksh. 2, 100. How much did she invest at each rate?

(4 marks)

Question Four (20 Marks)

- a) ABC Ltd employed a cost accountant who developed two functions to describe the operations of the firm. He found the marginal revenue function to be $MR = 25 - 5x - 2x^2$ and the marginal cost function to be $MC = 15 - 2x - x^2$ where x is the level of output. Determine the profit maximizing output and the total profit at that point. (10 marks)
- b) Let the market supply function of an item be $q = 160 + 8p$, where q denotes the quantity supplied and p denotes the market price. The unit cost of production is Ksh. 4. It is felt that the total profit should be Ksh. 500. What market price has to be fixed for the item so as to achieve this profit? (5 marks)
- c) A company sells x units of an item each day at the rate of Ksh. 50 per unit. The cost of manufacturing and selling these units is Ksh. 35 per unit plus a fixed daily overhead cost of Ksh. 1000.
- Determine the profit function. (3 marks)
 - How would you interpret the situation if the company manufactures and sells 400 units of the item a day? (2 marks)

Question Five (20 Marks)

- a) What is Break Even Point (BEP) in the cost revenue analysis? (2 mark)
- b) Supply and demand functions for a certain product are: $p = q^2 + 25$ and $p = -20q + 550$ respectively. Find market equilibrium point. (5 marks)
- c) Gatheru and Kabiru Certified Public Accountants have recently started to give business advice to their clients. Acting as consultants, they have estimated the demand curve of a client's firm to be:
- $$AR = 200 - 8Q$$

Where AR is average revenue in millions of shillings and Q is the output in units. Investigators of the client firm's cost profile shows that marginal cost (MC) is given by

$MC = Q^2 - 28Q + 211$ (In millions of shillings). Further investigations have shown that the firm's cost when not producing output is Sh. 10 million.

Required:

- The total cost function (3 marks)
- The total revenue function (2 marks)
- The level of output that maximize profit (8 marks)