



MUEO

# MOI UNIVERSITY

OFFICE OF THE DVC ACADEMIC AFFAIRS, RESEARCH AND EXTENSION

## UNIVERSITY EXAMINATIONS

### 2014/2015 ACADEMIC YEAR

*THIRD YEAR END OF SEMESTER EXAMINATIONS*

## FOR THE DEGREE OF BACHELOR OF BUSINESS MANAGEMENT

**EXAM CODE:       BBM 113**

**EXAM TITLE:     BUSINESS MATHEMATICS I**

**DATE: 10<sup>TH</sup> AUGUST, 2015    TIME: 9.00 A.M.-12.00 NOON.**

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*INSTRUCTION TO CANDIDATES*

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**BBM 113: Business Mathematics I**  
**MAIN EXAMINATION**

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**INSTRUCTIONS:-**

- Answer Question **ONE** and any other **THREE** questions.
  - Question **ONE** carries **25 Marks**
  - Time allowed: **3 hours**
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**QUESTION ONE**

a) Discuss the areas of application of business mathematics to a manager **(5 marks)**

b) If  $A = \{ m, n, o, p, a \}$   $B = \{ m, o, p, q, b \}$   $C = \{ m, p, r, c \}$  ; and the universal set is defined as

$U = \{ a, b, c, d, k, l, m, n, o, p, q, r, s, t \}$  , the: what is

i)  $A \cup B$                       ii)  $A \cap C$                       iii)  $B \cap C$                       iv)  $(A \cup B)'$                       v)  $(A \cap C)'$  **(4 marks)**

c) Write down the gradients and y-intercept of the following linear functions:

- i)  $Y = 13 + 4x$
- ii)  $Y = 3x - 12$
- iii)  $2y = 4x - 3$
- iv)  $X = 4y - 2$

**(4 marks)**

d) The demand of a commodity is such that when price is kshs. 18 demand is 6 units but when price reduces to kshs. 14 the quantity demanded increases to 54 units. Find the equation of this demand function and calculate the quantity demanded given price is kshs. 30. **(6 marks)**

e) A furniture factory manufactures two types of coffee table, A and B. each table goes through two distinct costing stages, assembly and finishing. The maximum capacity for assembly is 390 hours and for finishing, 330 hours. Each A table requires 8 hours assembly and 6 hours finishing, while a B table requires 2 hours for assembly and 4 hours for finishing. Calculate the number of A and B tables to be produced to ensure that the maximum capacity available is utilized.

**(6 marks)**

**QUESTION TWO**

a) Discuss the importance of understanding break-even point of a business activity **(5 marks)**



- b) Given the following demand function:  $Q = (38 - P)$ ; where  $Q$  is the level of output and  $P$ , the price per unit. The cost function is defined as  $TC = 10Q - 3Q^2 + 70$ .
- Derive the revenue function and the profit function.
  - Calculate the corresponding break-even point **(10 marks)**

### QUESTION THREE

- Discuss the ways in which Markov can be applied in solving business problems **(5 marks)**
- A bank classified its customers as category A, B or C, depending on the number of orders placed in a year. Records indicate there are 100 customers who are classified as A and 100 also classified as B and 100 as C; Furthermore each year 5 of the A customers are re-classified as B and 12 as C; 5 of the C customers are re-classified as A and 5 as C; and 9 of the C customers are re-classified as A and 10 as B.

Determine:

- The transition matrix
- The percentage of customers that the company expect to have in each category in the long-run **(10 marks)**

### QUESTION FOUR

- Explain the assumptions of linear programming **(5 marks)**
- A retailer deals in two items only, item A and item B. He has shs. 50,000 to invest and a space to store at the most 60 pieces. An item of A costs him kshs. 2500 and B costs kshs.500. A net profit to him on items A is shs. 500 and on item B is shs, 150. If he can sell all the items that he purchases, how should he invest his amount to have maximum profit?
  - Give a mathematical formulation to the linear programming problem.
  - Use graphical method to solve this problem
  - Indicate the feasible region on the graph **(10 marks)**

### QUESTION FIVE

- Explain the relevance of sets theory in business. **(5 marks)**
- A company produces products brands that can be classified into one or more of three categories: P for perishable products; S for special orders and E as exports. Out of total products produced in the month of July, 2015, 48 products could not be classified in any of the categories. 12 items were classified only as P, 16 were E only and 8 were S only. Exactly 14 items were classified into just two special categories and no items were classified into all three. Given also that there were 14 export items and 9 special order items, required:

- i) Present above information using venn diagrams
- ii) How many items were classified as perishable and
- iii) How many different stock items were held?

**(10 marks)**

### QUESTION SIX

- a) Describe the process of solving matrix algebra problem using Grammer's rule, use relevant examples **(5 marks)**
- b) Solve the following systems of linear equations for x, y and z using matrix algebra.

a.  $3x+2y-z=-1$   
 $X+ y + z = 6$   
 $3x+y+2z=15$

b.  $3x+y-z =10$   
 $X+2y+z =7$   
 $X - z = 3$

c.  $Y : z =2:1$   
 $10X+y= 0$   
 $5x+y+2z=15$

**(10 marks)**