



MUEO

# MOI UNIVERSITY

OFFICE OF THE CHIEF ACADEMIC OFFICER

## UNIVERSITY EXAMINATIONS

### 2008/2009 ACADEMIC YEAR

#### SECOND YEAR FIRST SEMESTER EXAMINATIONS

#### FOR THE DEGREE OF

## BACHELOR OF BUSINESS MANAGEMENT

**COURSE CODE:** BBM 204

**COURSE TITLE:** BUSINESS MATHS

**DATE:** 4<sup>TH</sup> DECEMBER, 2008 **TIME:** 2.00 P.M. – 5.00 P.M

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### INSTRUCTION TO CANDIDATES

- SEE INSIDE.

## BBM 204: BUSINESS MATHS

Answer any **FOUR** questions

### Question One

Isinya in Kajiado District is a community of cattle farmers. A research gathered information from a sample of 800 cattle farmers in an attempt to investigate the loyalty of farmers to a particular breed of cattle being bred in that particular community. A survey at the beginning of 2007 reveals the following information on breed switching pattern.

Among the original 250 farmers of exotic breeds, 180 farmers remain loyal to the breeds, 30 farmers switched to local breeds and 40 farmers switched to the dual breeds. Similarly on the original 250 farmers of the local breed, 200 farmers remained loyal to the breed, while 20 farmers switched to exotic breeds. And on the original dual breed farmers; 30 farmers switched to the local breeds while the rest remained loyal.

Assuming the prevailing switches pattern continues.

- (a) Prepare a contingency table. (7 marks)
- (b) Prepare a transition probability matrix for the above Markov process. (8 marks)
- (c) State the uses of Markovian analysis. (10 marks)

### Question Two

In the school of Business and Economics, lecturers Kamau, Kiprono, Wekesa and Munyao have masters degrees, with Kamau and Munyao also having Doctorate degrees. Kamau, Otieno, Wekesa, Nyevu, Ekeru and Onkware are members of Institute of Certified Public Accountants of Kenya (ICPAK) with Nyevu and Ekeru having masters degree. Identify set A as those lectures with masters degree; set B as those who are ICPAK members and set C as doctorate holders.

- (a) Specify the elements of A B and C. (6 marks)
- (b) Draw a diagram representing sets A, B, and C together with their known elements. (5 marks)
- (c) What special relationship exists between set A and C? (2 marks)

- (d) Specify the elements of the following sets and for each set, state in words what is being conveyed?
- (i)  $A \cap B$ ;      (ii)  $C \cup B$       and      (iii)  $C \cap B$ ,      (3 marks each)
- (f) What would be a sustainable universal set for the scenario?      (3 marks)

### Question Three

(a) If  $A = \begin{bmatrix} 1 & -7 \\ 3 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} -4 & 5 \\ -2 & 1 \end{bmatrix}$

Find X such that  $2A - 3B + 2X = 0$

(10 marks)

(b) A firm produces three products A, B and C which it sells in two markets.

Annual sales in the units are given below.

Units sold of each product.

Market	A	B	C
I	8000	4000	16000
II	7000	18000	9000

If the prices per unit of A B and C are Shs. 2.50, Shs 1.25 and Shs 1.50 , Shs 1.70, Shs 1.20 and Shs 0.80 respectively; find the total profit in each market by using matrix algebra.      (15 marks)

### Question Four

- (a) A carpenter has 90, 80 and 50 running feet respectively of teak, plywood and rose wood. The product A requires 2, 1 and 1 running feet and product B requires 1, 2 and 1 running feet of teak, plywood and rosewood respectively. If A would sell for Shs 48 and B would sell for Shs 40 per unit, how much of each should he make and sell in order to obtain the maximum gross income out of his stock of wood?
- (i) Give a mathematical formulation to this linear programming problem.      (8 marks)
- (ii) Use graphical method to solve the problem.      (17 marks)

### Question Five

(a) Find  $\frac{dy}{dx}$  of the following.

(i)  $y = 3x^2$

(ii)  $y = \frac{3}{x^2}$

(iii)  $ax^4 + bx^3 + cx^2 + dx + e$

(iv)  $\sqrt{x + x^3}$

(v) Find  $\frac{d^2y}{dx^2}$  of  $y = 6x^4 + 3x^3 - 22$  (1 mark each)

(b) Determine the coordinates and nature of any turning points on the curve represented by the function.

$$y = x^3 - 7.5x^2 + 18x + 6 \quad (20 \text{ marks})$$

### Question Six

(a) A company subsidizes a certain road journey for some of its employees. When the price of the tickets is increased by shs 6, the number of tickets which the company can purchase for Shs 2,850 is reduced by 36. Find the percentage increase in the price of the ticket. (12 marks)

(b) A mathematically minded Hawker with no overheads has found that the weekly volume of sales of a toy are approximately  $100/p^2$  where P is the fixed price of the toy. The toy costs the trader 15P. Find

(i) The level of p which maximizes profits.

(ii) The level of the maximum profit.

(iii) The weekly volume of toys sold at this level.

(13 marks)