



GARISSA UNIVERSITY

**UNIVERSITY EXAMINATION 2017/2018 ACADEMIC YEAR ONE
FIRST SEMESTER EXAMINATION**

SUPPLEMENTARY/SPECIAL EXAMINATION

SCHOOL OF BUSINESS AND ECONOMICS

FOR THE DEGREE OF BACHELOR OF BUSINESS MANAGEMENT

COURSE CODE: BBM 113

COURSE TITLE: INTRODUCTION TO BUSINESS MATHEMATICS

EXAMINATION DURATION: 3 HOURS

DATE: 21/03/18

TIME: 2.00-5.00 PM

INSTRUCTION TO CANDIDATES

- **The examination has SIX (6) questions**
- **Question ONE (1) is COMPULSORY**
- **Choose any other THREE (3) questions from the remaining FIVE (5) questions**
- **Use sketch diagrams to illustrate your answer whenever necessary**
- **Do not carry mobile phones or any other written materials in examination room**
- **Do not write on this paper**

This paper consists of FIVE (5) printed pages

please turn over



QUESTION ONE (COMPULSORY)

- (a) Give three reasons why a mathematical approach in business analysis is preferable and more efficient than the literary approach. **[3 marks]**
- (b) Classify the following sets as either finite or infinite.
- i. $\{x: x \text{ is an odd number}\}$ **[1 mark]**
 - ii. $\{\text{all multiples of } 10\}$ **[1 mark]**
 - iii. $\{\text{all insects in GUC compound}\}$ **[1 mark]**
 - iv. $\{\text{all camels in Garissa County}\}$ **[1 mark]**
- (c) Find the determinant of
- $$\begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 1 \\ 3 & 1 & -2 \end{pmatrix}$$
- [4 marks]**
- (d) Define a linear function. **[2 marks]**
- (e) A linear function is given in standard form as $40x - 30y + 6000 = 0$. State the slope and the point at which it crosses the y-axis. **[3 marks]**
- (f) A survey of 100 students revealed that 82 students were taking Mathematics and 65 were taking English. All the 100 students were in either Mathematics or English. Using a Venn diagram, for illustration, find how many students take both Mathematics and English. **[4 marks]**
- (g) The cost of hiring a school bus consists of two parts, one of which is fixed and the other varies as the distance covered by the bus. If sh.450 is charged for hiring the bus for a distance of 100km, and sh.400 for a distance of 60km, find an equation connectivity C and D where C is the cost of shillings for hiring the bus for a distance of D kilometers **[5 marks]**



QUESTION TWO

- (a) In a class of 30 students, 15 study Art, 18 study Biology and 2 study neither. How many students study both Art and Biology? **[4 marks]**
- (b) In a bid to rehabilitate street children in the city of Nairobi, a study of their drug taking behavior from a sample of 112 children has the following statistics.
- 50 children used drug A
 - 66 children used drug B
 - 38 children used drug C
 - 32 used drug A and B
 - 22 used drug B and C
 - 20 used both A and C
 - 24 used none of the drugs
- Determine the number of students who used;
- (i) All the three drugs
 - (ii) Drug C only
 - (iii) At most one of the drugs
 - (iv) At least two of the drugs
- [11 marks]**

QUESTION THREE

- a) Find the inverse of the matrix

$$\begin{pmatrix} 1 & -2 & 1 \\ 1 & 2 & 3 \\ 3 & 0 & 1 \end{pmatrix}$$

Hence, solve the simultaneous equations

$$x - 2y + z = 4$$

$$x + 2y + 3z = 4$$

$$3x + z = 2$$

[7 marks]

- b) Below are formulated equations with three variables x, y and z intent on optimizing profit. Use Cramer's rule to determine the value of each variable. **[4 marks]**
- c) State four conditions/requirements for a system to be called Markovian process. **[4 marks]**



QUESTION FOUR

- (a) A small town with a population of 10,000 people has three banks A, B and C. It has been established that customers shift from one bank to another each month. The transition probability matrix is

$$p = \begin{matrix} & \begin{matrix} A \\ B \\ C \end{matrix} \end{matrix} \begin{pmatrix} 0.6 & 0.3 & 0.1 \\ 0.4 & 0.5 & 0.1 \\ 0.2 & 0.1 & 0.7 \end{pmatrix}$$

Initially the market shares are

A	-	30%
B	-	40%
C	-	30%

Determine the market share after one month.

[4 marks]

- (b) A certain commodity has demand and supply functions both of which have been estimated to be linear. When the price $P = \text{sh.}7500$, q the quantity $q = 1000$ units and when the $P = \text{sh.}4625$, the quantity $q = 750$ units. Obtain a linear equation from the information given and state, giving reasons, whether it is a supply function or a demand function
- (c) Briefly explain what is meant by “market equilibrium”

[7 marks]

[4 marks]

QUESTION FIVE

- (a) Solve the linear equation

$$\frac{9x+4}{8} = 5$$

[3 marks]

- (b) A quantity y is partly constant and partly varied inversely as x^2 . If $y = 7$ when $x = 10$ and $y = 5\frac{1}{2}$ when $x = 20$, write an equation connecting y and x and hence y when $x = 3$.

[5 marks]

- (c) The cost of renting a car includes a fixed charge of Ksh.200 and a variable cost of Ksh.5.00 per km. Find the cost of renting a car and driving it for 750km.

[4 marks]

- (d) Solve the simultaneous equations by eliminating or substitution.

$$2x + 6y = 8$$

$$2x + 8y = 20$$

[3 marks]



QUESTION SIX

- (a) The perimeter of a rectangular piece of land whose length is x metres and width is y metres is not more than 10 metres. Form all the inequalities connecting x and y . **[4 marks]**
- (b) A contractor intends to transport 1000bags of cement using a lorry and a pick-up. The lorry can carry a maximum of 80bags while the pick-up can carry a maximum of while the pick-up can carry a maximum of 20bags. The pick-up has to make more than twice the numbers of trips the lorry makes. The total number of trips has to be less than 30. The cost per trip is sh.200 for the lorry and Ksh.90 for the pick-up respectively. Find the minimum expenditure if the number of trips made by the lorry and pick-up is x and y respectively. **[11 marks]**

