



GARISSA UNIVERSITY

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

SCHOOL OF BUSINESS AND ECONOMICS

FOR THE DEGREE OF BACHELOR OF BUSINESS MANAGEMENT

COURSE CODE: BBM 113

COURSE TITLE: INTRODUCTION TO BUSINESS MATH I

EXAMINATION DURATION: 3 HOURS

DATE: 10/04/18

TIME: 9.00-12.00 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 two reasons why a mathematical approach in business analysis is preferable and more efficient than the literary approach. [2 marks]

(b) Given that $M = \{x \mid 2 \leq x \leq 8\}$, M is Universal Set

$A = \{2, 3, 4\}$, $B = \{4, 6\}$ and $C = \{3, 5, 6, 7\}$

i. $A' \cap C$ [1 marks]

ii. $C' \cap M \cup B$ [2 marks]

(c) Solve the following system of equations using matrix inverse. [4 marks]

$3x - 5y = -9$

$5x + 2y = 16$

(d) In a college of 372 students, 123 students are in the band, 236 students are on sport team and 78 students participate in both activities. How many students are involved in:

i. Either band or sports [3 marks]

ii. Neither in the band nor sports [2 marks]

(e) A retiree receives \$1290 a year interest from \$10,200 placed in two bonds, one Paying 15% and the other 11%. How much is invested in each bond? [4 marks]

(f) Find the equilibrium price and quantity for the following market model using Cramer's rule. [4 marks]

$P + 4Q_d - 100 = 0$

$P - Q_s - 50 = 0$

(g) $\overline{Q_d} = \overline{Q_s} = \overline{Q}$

(h) Find the determinant of the following matrix. [3 marks]

$$\begin{pmatrix} 2 & 7 & 4 \\ 3 & 1 & 6 \\ 5 & 0 & 8 \end{pmatrix}$$

QUESTION TWO

A firm has a budget of B= Ksh180 for purchasing capital K and labour L priced at Ksh 3 and Ksh 4 per unit respectively.

Required:

i. Find the corresponding isocost line. [2 marks]

ii. Sketch the line on a Cartesian coordinate plane. [3 marks]

iii. i. If the budget declines by 40%, find the new isocost line. [2 marks]

ii. Sketch the new and the old isocost lines on the same graph. [3 marks]



- iv. If the price of capital rises to 6, find the new isocost line. **[2 marks]**
ii. Sketch this isocost and the original one on the same graph. **[3 marks]**

QUESTION THREE

Market segmentation is known as the process of dividing up a market for goods or services into smaller groups: geographic, demographics and psychographics. A total of 1800 advertisements were run to try and reach out the various segments. The following list the breakdown of each:

- 680 for a geographic location
- 500 based on demographics
- 440 based on psychographics
- 385 based on both demographics and geographic
- 245 based on geographic and psychographics
- 325 based on both demographics and psychographics
- 245 based on all three segments

Required:

- (a) Present the above information in a Venn diagram. **[4 marks]**
- (b) Find the number of:
- i. Advertisements that were run either for psychographics or demographics **[2 marks]**
 - ii. Advertisements that were not run for geographic **[2 marks]**
 - iii. Advertisements that were not run for any these segments **[2 marks]**
 - iv. Advertisements that were not run for geographic but were run for demographics **[2 marks]**
- (c) A firm has 240 hours of skilled labour available each week to produce two products Each unit of the first product x requires 3 hours of skilled labour and second product y requires 4 hours.
- i. Express the firm's labour constraint in terms of an equation. **[1 marks]**
 - ii. Find the slope and the y-intercept of your equation. **[2 marks]**



QUESTION FOUR

(a)

(a) Given $\mathbf{B} = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$ and $\mathbf{C} = \begin{pmatrix} 5 & 4 \\ -1 & 6 \end{pmatrix}$

Find:

(i) BC

(ii) B^2C

[5 marks]

(b) A multinational corporation produces a wide range of electronic products.

P_1 represents the profits from the sales of a new DVD player.

P_2 Represents profits from the sales of a new plasma TV set.

P_3 represents profits from the sales of Hifi system.

The business department believes that the profits in \$ are linked as follows:

$$P_1 + 2P_2 + P_3 = 40000$$

$$3P_1 - 4P_2 - 2P_3 = 20000$$

$$5P_1 + 3P_2 + 5P_3 = -10000$$

Required:

Work out the profits of each product using matrix inverse and interpret your answers.

[10 marks]

QUESTION FIVE

(a) In a class of 30 students, 15 study Marketing and 18 study Finance and 2 study neither. How many students study both Marketing and Finance **[4 marks]**

(b) A manufacturer makes two products x_1 and x_2 . The first requires 5 hours for processing, 3 hours for assembling and 4 hours for packaging. The second requires 2 hours for processing, 12 hours for assembling and 8 hours for packaging. The plant has 40 hours available for processing, 60 hours for assembling and 48 hours for packaging. The profit margin for x_1 is \$7 and for x_2 it is \$21.



Required:

Express the data in equations and inequalities necessary to determine the output mix that will maximize profits. **[11 marks]**

QUESTION SIX

(a) A company is considering using Markov theory to analyze brand switching between three different brands of floppy disks. Survey data has been gathered and has been used to estimate the following transition matrix for the probability of moving between brands each month:

		To Brand		
		1	2	3
From Brand	1	0.80	0.10	0.10
	2	0.03	0.95	0.02
	3	0.20	0.05	0.75

The current (month 1) market shares are 45%, 25% and 30% for brands 1, 2 and 3 respectively.

- i. What will be the expected market shares after two months have elapsed (i.e in month 3) **[5 marks]**
- ii. What is the long-run prediction for the expected market share for each of the three brands **[8 marks]**
- iii. Would you expect the actual market share to approach the long-run prediction for the market or not (and why) **[2 marks]**

