



# **GRETSA UNIVERSITY - THIKA**

## **UNIVERSITY EXAMINATIONS MAY - AUGUST 2018 SEMESTER**

### **DIPLOMA IN BUSINESS**

**COURSE CODE: DBCC 014**

**COURSE TITLE: INTRODUCTION TO BUSINESS MATHEMATICS**

**DATE: 6<sup>TH</sup> AUGUST 2018**

**TIME: 8.00 AM – 11.00 AM**

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#### **INSTRUCTIONS TO CANDIDATES**

1. SECTION A IS **COMPULSORY**.
2. SECTION B: ANSWER ANY OTHER **THREE** QUESTIONS.
3. **DO NOT** WRITE ANYTHING ON THIS QUESTION PAPER AS IT WILL BE AN EXAM IRREGULARITY.
4. ALL ROUGH WORK SHOULD BE AT THE BACK OF YOUR ANSWER BOOKLET AND CROSSED OUT.

**CAUTION:** *All exam rooms are under CCTV surveillance during the examination period.*



## SECTION A: COMPULSORY

### Question One

- a) Among a group of campus students, 50 enrolled in an English class, 50 in Kiswahili and 40 in French. 5 took both English and Kiswahili, 10 took Kiswahili and French, 5 took English and French. 10 studied all three. If every student studied at least one language, find the number of students and how many studied English only, Kiswahili only and only French?

**[10 Marks]**

- b) A company originally produces 20 units of a certain model of a car per month. Recently there were efforts to scale this up a bit by a further 10 units of these cars. The marginal revenue function and marginal cost functions are provided below:

$$MR = 3000 - 6x$$

$$MC = X^2 - 300 + 900$$

Determine the total revenue, total cost and the increase in profit when 10 extra units are produced.

**[10 Marks]**

- c) Unga limited have two products in the market, unga chapatti and unga ugali. These two products are sold at different prices provided below:

$$\text{Unga chapatti} = 300 - X$$

$$\text{Unga ugali} = 400 - 5Y$$

The total cost function for the two products is provided below:

$$X^3 + 6XY + Y^3$$

You are required to determine the profit function for these two products, the values of both x and y that maximize profit, and also determine the prices for the two products.

**[10 Marks]**

- d) Sugar and coffee exhibit interdependent demand and supply. Demand and supply functions for the two products are provided below:

$$QD_s = 70 - 6X_1 - X_2$$

$$QD_c = 90 - 4X_1 - 7X_2$$

$$QS_s = 10X_1 - 8$$

$$QS_c = 5X_1 - 9$$

Determine the equilibrium price and quantity for the two products.

**[10 Marks]**

## SECTION B: ANSWER ANY THREE QUESTIONS

### Question Two

- a) Kamau's factory makes two products namely bread and butter. The cost of making 50 units of bread and 30 units of butter is sh. 1500. The cost of making 25 units of bread and 15 units of butter is sh. 900. Kamau makes a profit of 15% and 23% on every unit of bread and butter respectively. Express the cost of making these two products as a simultaneous equation and use an appropriate method to find the solution to the problem. [10

**Marks]**

- b) In a market where demand and supply factors are at play, the following is observed. At a unit price sh. 3700 the units are 400 and when the price is sh. 2500, the units are 270. When the price is sh. 2200, the units are 250, and at a unit price of sh. 1800, the units are 350.

Determine the equilibrium price and quantity for this market.

**[10 Marks]**

### Question Three

- a) The following information relates to a closed economy:

$$C = 900 + 0.75Y$$

$$I = 400$$

$$G = 500$$

$$T = 300 + 0.15Y$$

$$\partial Y = 350$$

$$\partial T = 120$$

- i. Determine the equilibrium level of income, consumption and savings **[7 Marks]**
  - ii. Determine the new equilibrium level of income consumption and savings factoring changes in income and tax. **[3 Marks]**
- b) The manager of a retail shop is faced with a situation where he has to stock his shop granted that he has limited resources. His fastest moving products are sugar and coffee. There is not more than sh. 2000 to spend on these two items. He wants to buy twice as many units of sugar as coffee. He wants to spend a maximum of sh. 1500 on

sugar and at least sh. 300 on coffee. Profit for a packet of sugar is sh. 130 and sh. 100 for a packet of coffee.

- i. Write down these inequalities and present them on a graph. **[7 Marks]**
- ii. Determine the number of packets that he must sell of each product and calculate the maximum profit. **[3 Marks]**

#### **Question Four**

- a) BIG group normally invests in short duration projects in different areas of the country usually for a maximum period of one year. Recently the company invested in a project and it is estimated that after operating for several months the profits (000s) from this project can be summarized by the following equation:

$$Y = 70.5x - 5x^2 - 100$$

- i. Determine the breakeven time, and the initial cost for this project **[5 Marks]**
  - ii. Sketch a graph of the function and determine the most appropriate time to end this project. **[5 Marks]**
- b) Write brief notes on the following terms as discussed in your business math class
- i. Intersection of sets **[2 Marks]**
  - ii. Union of sets **[2 Marks]**
  - iii. Set complements

$$2x + 4y - z = 30$$

$$4x - 2y + z = 15$$

$$1x + 3y - 4z = 18$$

- a) Find the stationary points of the following equations and show the turning points.

$$Y = 4x^2 - 30x + 50 \quad \textbf{[5 Marks]}$$

$$Y = 3x^2 + 15x + 75 \quad \textbf{[5 Marks]}$$