# GRETSA UNIVERSITY-THIKA

## UNIVERSITY EXAMINATIONS

## JANUARY – APRIL 2017 SEMESTER

## BACHELOR OF COMMERCE

**COURSE CODE: BCBA 103**

**COURSE TITLE: BUSINESS MATHEMATICS**

**DATE:** **TIME: 3 Hours**

**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 1**

a) Evaluate $\int(8x^3 - 3x^2 + 6x - 10)dx$ ***(3 Marks)***

b) The total revenue obtained from selling 'x' hundred items in a particular day is given by 'R' which a a function of variable 'x'. The marginal revenue MR=20-4x.
Required;

i. Determine the total revenue function***(5 Marks)***
ii. Find the number of items sold in one day that will maximize the total revenue and evaluate the total revenue at that point.
***(5 Marks)***

c) A shop buys 200g packets of Tea and 500g packets of Coffee. Tea costs 50 shillings each and Coffee costs 70 shillings per packet. There is a maximum of Ksh. 3,000 to spend;

**i)** Formulate an inequality to represent this information ***(5 Marks)***

ii) The number of coffee packets should not be greater than the tea packets. Write down an inequality to show this information.***(5 Marks)***

iii) There must be at least 40 packets of Tea. Write down an inequality to show this information***.*** ***(3 Marks)***

iv) What is the maximum number of Tea packets the trader can buy if he has to buy 5 packets of Coffee? **.** ***(7 Marks)***

d) Two dice are thrown once on the table. Assuming both dice are unbiased;

***i)*** Draw a table of the sample space ***(4 marks)***

ii) What is the probability of drawing (5,4) in both the dice ***(3 marks)***

## SECTION B: ANSWER ANY THREE QUESTIONS

**Question 2**

a) Differentiate the following with respect to 'x'.

$i)\ y = \sqrt{3x^2 - 4}$ ***(2 marks)***

$ii)\ y = (x^2 - 1)(4x^3 - 5)$ ***(2 marks)***

iii) $y = \ln(x^2 - 5x + 6)$ ***(3 marks)***

$iv)\ y = e^{lnx}$ ***(3 marks)***

iv) $y = x^2e^x$ ***(3 marks)***

b) The profit function of a certain firm is given by the following function;
$\pi = aQ^2 + bQ + c$
It is known that if $\pi = 9,\ 34\ and\ 19\ when\ Q = 1,\ 2\ and\ 3\ respectively.$
i) Solve for the values of a, b and c. ***(3 marks)***
ii) Determine the breakeven point. ***(4 marks)***

**Question 3**

The table below shows the unit price of a certain product and the corresponding quantity demanded.

| Price(Ksh) 'P' | 40 | 44 | 48 | 52 | 56 | 60 |
|---|---|---|---|---|---|---|
| Demand Quantity('000kg) 'Q' | 64 | 56 | 48 | 40 | 32 | 24 |

Required;
a) Plot a graph of the unit price against the demand quantity ***(5 marks)***
b) Use your graph to derive an equation for the unit price, 'P', in terms of the demand 'Q'. ***(5 marks)***
c) What would be the quantity demanded for a price of 70? ***(5 marks)***
d) Determine the quantity and the price that should be charged to maximize the profit. ***(5 marks)***

**Question 4**

a) Consider the following consumption function;

$$C = 2.6 + 0.65Y^d \qquad \text{Where } Y^d = Y - T\ and\ T = tY$$

i) Express consumption C as a function of total income Y. ***(5 marks)***
ii) Find the level of C if t=0.3 and Y=100 ***(5 marks)***

b) Given the following investment and import function;

$$S = \beta_0 + \beta_1 Y$$

X=100

i) Determine the values of S and X at the following levels of income; Y=0; 100. ***(4 marks)***
ii) If income drops by 100, what proportion of that drop will be a drop in savings? ***(3 marks)***
iii) Will the drop in income affect exports? Explain. ***(3 marks)***

**Question 5**

a) A company produces two goods A and B and the prices are given below;

$P_1 = 50 - x$

$P_2 = 95 - 3y$

The total cost function is given as $C = x^2 + 3xy + y^2$;

i) Determine the profit function '$\pi$" ***(4 marks)***
ii) Determine the value of x and y that maximizes profit. ***(3 marks)***
iii) Deduce the corresponding prices ***(3 marks)***

b) The total profit per acre on a wheat farm has been found to be related to the expenditure per acre for labour and soil improvement as in the following function;

$$Profit = 48x + 60y + 10xy - 10x^2 - 6y^2$$

Where x = Expenditure per acre spent on labour

y = Expenditure per acre spent on soil improvement

Determine;

i) The value of 'x' that maximizes profit ***(4 marks)***
ii) The value of 'y' that maximizes profit ***(4 marks)***
iii) Maximum profit ***(2 marks)***