



**STRATHMORE UNIVERSITY**  
**STRATHMORE INSTITUTE OF MATHEMATICAL SCIENCES**  
**END OF SEMESTER EXAMS FOR THE DEGREE OF BACHELOR OF**  
**BUSINESS SCIENCE IN FINANCIAL ECONOMICS AND FINANCIAL**  
**ENGINEERING**  
**BSE 2106: INTERMEDIATE MICROECONOMICS**

27<sup>th</sup> July, 2022

Time: 2.5 hours

**Instructions**

1. This exam consists of five questions
2. Answer question **ONE (Compulsory)** and **any other two**

**Question 1**

- (a) Cauchy consumes and derives satisfaction from T-shirts and movies according to Table 1

Table 1: **Utility derived from Cauchy's Consumption of T-shirts and Movies**

Units	Total Utility from T-shirts	Total Utility from Movies
0	0	0
1	20	24
2	38	45
3	54	63
4	68	78
5	80	87
6	90	90

- (i) Suppose that Cauchy has a total of KES24 that he wishes to spend on T-shirts and movies, how many units of each good will he consume if a T-shirt goes for KES2 and a movie goes for KES3 ? {5 marks}

- (ii) Suppose you had estimated Table 1 using an app that gathered Cauchy's information overtime. Suppose further that you wish to prove to your classmates the effectiveness of your app in predicting human behaviour by predicting Cauchy's stepwise decision making. While detailing the rationale for the various decisions made by Cauchy state the step wise decisions (expenditures) that would be predicted by your app. {7 marks}
- (b) Consider a firm that produces tea bags according to the function:  $q = f(k, l) = k^{\frac{1}{2}}l^{\frac{1}{2}}$  where  $k$  is capital and  $l$  is labour. Required:
- (i) If  $k = 1600$  units state the production function in terms of  $l$  {2 marks}
- (ii) State an expression for the marginal product of labour and show that it is diminishing {3 marks}
- (iii) If the firms objective is to maximize profits, how many workers will it hire if the hourly wage rate is KES10, capital costs KES25 and a tea bag goes for KES50 each {2 marks}
- (iv) How much profit will this firm earn? {1 mark}
- (c) Supply the utility and production functions for the behaviour of marginal rate of substitution (MRS) and marginal rate of technical substitution (MRTS) provided.
- (i) MRS is constant {2 marks}
- (ii) MRTS is infinite, zero or nothing in-between {2 marks}
- (iii) MRS is diminishing {2 marks}
- (d) Consider the production function  $q = \min\{\frac{l}{2}, \frac{k}{3}\}$ . Where  $l$  is labour,  $k$  is capital and  $q$  is output. What is the associated cost function if  $l$  costs  $w$  per unit and  $k$  costs  $r$  per unit? {4 marks}

[30 marks]

## Question 2

- (a) Jane's utility function is  $u(x_1, x_2) = x_1x_2^4$ . If her income is  $M$  and the price of good  $i$  is  $P_i$ . Find;
- (i) What is the opportunity cost of consuming good 1 according to the budget line {2 marks}
- (ii) The rate at which good 1 is substituted for good 2 according to the utility function {3 marks}
- (iii) Jane's optimal consumption of good 1 and 2 {5 marks}
- (b) Suppose Jane's income is KES1,000 and  $P_1$  changes from KES40 to KES20. Compute;
- (i) The change in the quantity demanded of good 1 due to the change in income occasioned by the price fall {5 marks}
- (ii) The change in the quantity demanded of good 1 due to it being relatively cheaper compared to good 2 {5 marks}

[20 marks]

## Question 3

- (a) A firm is producing output according to the function  $q = f(k, l) = k^{\frac{1}{2}}l^{\frac{1}{2}}$ . Where  $k$  is capital and  $l$  is labour. Required:
- Compute this production functions degree of homogeneity and interpret your results {3 marks}
  - Find an expression for the output supply curve for this firm if  $l$  costs  $w$  per unit,  $k$  costs  $r$  per unit and output is sold at  $p$  per unit {5 mark}
  - Find expressions for the unconstrained factor demands {4 marks}
- (b) According to the indifference curve approach implicit to the concept of marginal rate of substitution is the concept of marginal utility. With the help of a consumer who consumes good  $x$  and  $y$ , a well labelled diagram and clear derivations prove this statement {8 marks}

[20 marks]

#### Question 4

- (a) In studying a consumer economists have two study pathways that they can pursue. Required:
- Identify these pathways and state the assumptions necessary for each of them to be applied in studying consumers {8 marks}
  - Show that irrespective of the pathway pursued, the conclusions are the same. {2 marks}
- (b) A monopolist is facing a demand function given by:  $Q = 2000 - 10P$  where  $Q$  is quantity produced and  $p$  is the price per unit in KES. If the firm marginal cost is KES100 Required
- Calculate the monopolists equilibrium price and quantity {3 marks}
  - Calculate the monopolists equilibrium price and quantity if the he behaved competitively {3 marks}
  - A monopolist is known to cause inefficiency, find the value of the dead weight loss due to this monopolist {4 marks}

[20 marks]

#### Question 5

- (a) A firm is producing output according to production function  $q = f(k, l) = 10k^{\frac{1}{4}}l^{\frac{1}{4}}$ . Where  $k$  is capital and  $l$  is labour. Required
- Find expressions for this firm's constrained factor demands if  $l$  costs  $w$  per unit,  $k$  costs  $r$  per unit {10 marks}
  - Find this firm's cost function {10 marks}

[20 marks]

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