



**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**

26<sup>th</sup> March, 2024

Time: 2 hours

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**Instructions**

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

**Question 1**

- (a) Consumer behaviour can be studied using two key approaches:
- (i) State these two approaches {2 marks}
  - (ii) State the assumptions on preferences that are made by one of these approaches {4 marks}
  - (iii) With the help of mathematical expressions, show that the approaches have different assumptions but similar conclusions {4 marks}
- (b) 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
- (i) Find expressions for this firm's constrained factor demands if  $l$  costs  $w$  per unit,  $k$  costs  $r$  per unit {8 marks}
  - (ii) Find this firm's cost function {2 marks}
- (c) A monopolist demand function is given as  $Q = 2000 - 10P$ , where  $Q$  is output produced and sold by the monopolist at price  $P$ . If the monopolist faces constant marginal costs at KES100, Find
- (i) The monopolists equilibrium price and quantity {4 marks}
  - (ii) The equilibrium price and quantity if the monopolist behaved competitively {3 marks}
  - (iii) Represent the information in 1(c) (i)-(ii) on a well labelled diagram and use it to calculate this monopolists inefficiency {3 marks}

**[30 marks]**

## Question 2

- (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) A firm uses workers and machinery to farm. Using a single worker and 2 units of machinery the farm produces 1000 units of output. If the firms production function is  $Q = w^a m^b$  where  $Q$  is output,  $w$  is the number of workers and  $m$  is machinery. Required:
- (i) State the nature of returns to scale and the sum of  $a$  and  $b$  if doubling inputs increases output to 2000 units. {3 marks}
- (ii) State the nature of returns to scale and the sum of  $a$  and  $b$  if doubling inputs increases output to 2500 units. {3 marks}
- (iii) State the nature of returns to scale and the sum of  $a$  and  $b$  if doubling inputs increases output to 1500 units. {2 marks}

[20 marks]

## Question 3

Nadia likes pork Ribs ( $R$ ) and Chicken wings ( $C$ ). Her utility function is  $U(R, C) = 10R^2C$ . Her weekly income is KES90 which she spends exclusively on  $R$  and  $C$ . The price for a slab of ribs is KES10 and KES5 for a piece chicken. Required:

- (a) Find the optimal amount of pork ribs and chicken wings that Nadia will have given her economic environment {6 marks}
- (b) Find Nadia's Marshallian demand functions for pork ribs and chicken wings if they cost  $P_1$  and  $P_2$  respectively and her income is  $M$ {4 marks}
- (c) Are pork ribs and chicken wings normal goods for Nadia? {2 marks}
- (d) The price of ribs falls to KES5. Required:
  - (i) Estimate the total effect of this price change if the price of chicken wings remain the same and Nadia's income remains at KES90 {2 marks}
  - (ii) Estimate the substitution effect of this price change {3 marks}
  - (iii) Estimate the income effect of this price change {3 marks}

[20 marks]

#### Question 4

The following equation describes John's weekly budget line. Use it to answer the following questions:

$$C = 1420 - 10L \quad (1)$$

- (a) Determine how much John is paid per hour and his non-labour income if  $T=110$  hours {3 marks}
- (b) At what wage will John be indifferent between working and not working if the marginal utility of leisure is  $(MU_L = C - 100)$  ( $C$  is consumption) and that of consumption is leisure  $(MU_C = L)$ . {4 marks}
- (c) Given the marginal utilities in 4(b) above calculate the optimal number of hours that John will allocate to leisure and work {4 marks}
- (d) Suppose the government increased non-labour income to \$520. Estimate the effect of this measure on John's optimal hours of leisure and work and state the economic intuition behind your findings. {4 marks}
- (e) Suppose the wage rate increased more than the estimate in 4(a) above. State the conditions under which:
  - (i) The wage increase will lead to an increase in the number of hours of work {2 marks}
  - (ii) The wage increase will lead to a decrease in the number of hours of work {2 marks}
- (f) What is the implication of your findings in 4[e(i)]and 4[e(ii)] to human resource professionals who seek to get more committed workers through a wage rise {1 mark}

[20 marks]

#### Question 5

Consider the short run production function  $Q = f(k, l) = 6l^2 - 0.4l^3$ . Where  $Q$  is output,  $k$  is capital and  $l$  is labour. Capital is fixed at one unit. Use the function to find the values of output ( $TP_l$ ) for  $l = 0, 1, 2, 3, \dots, 12$  and Use the the resulting table to answer the following questions: {3 marks}

- (a) Find the marginal product of labour of labour  $MP_l$  {3 marks}
- (b) The average product of labour of labour  $AP_l$  {3 marks}
- (c) Identify the three stages of production {3 marks}
- (d) What are the managerial implication of each stage of production {4 marks}
- (e) Find the optimal number of workers who should be hired if the output price is KES2 and the prevailing wage rate is KES11.2 {4 marks}

[20 marks]

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