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

27th July, 2023 **Time: 2 hours**

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 according to the production function $q = \min\{2k, l\}$. Where q is the firms output, k is capital and l is labour. Required:
   (i) Using a well labelled diagram, sketch the firms isoquant corresponding to 10 units of output. {3 marks}
   (ii) If k costs r and l costs w, what cost function does this firm face {4 marks}
   (iii) Using clear mathematical expressions, show that this firm faces constant marginal costs. Find the value of the fixed marginal cost if $r = 16$ and $w = 4$ {3 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 theory of the consumer can be applied in studying labour supply. Consider a worker who derives satisfaction from a generic numeraire good C and leisure L hours. If this worker has T hours per week, has non-labour income V and is paid KESW per hour, required

(a) State this workers budget line {3 marks}

(b) State this worker's optimization problem and the three decisional outputs arising from its solution {4 marks}

(c) Suppose this workers utility function were $U(C, L) = C^2L^2$, $T = 168$ hours, V=KES0 and W=KES20. State the workers optimization problem and solve for the decisional outputs in 4(b) above {6 marks}

(d) Suppose V increased to 200 through a policy change, how would this change affect the workers decisions {4 marks}

(e) Use your findings in 4(d) above to to predict the consequences of establishing unemployment benefits in Kenya {3 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

  (i) Find expressions for this firm's constrained factor demands if l costs w per unit, k costs r per unit {10 marks}

  (ii) Find this firm's cost function {4 marks}

(b) In optimizing the behaviour of a consumer for consumers with different functional forms of utility functions, boundary or interior solutions may be arrived at. With the help of clearly labelled diagrams and utility functions, state the utility functions that will yield boundary and interior solutions {6 marks }

[20 marks]

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