Strathmore
UNIVERSITY

STRATHMORE INSTITUTE OF MATHEMATICAL SCIENCES
BSE 2106: MICROECONOMICS II
END OF SEMESTER EXAMINATION

DATE: 16th July 2019 Time: 2 hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question one (COMPULSORY)** and any other **TWO** Questions.

Question 1

(a) Explain the following assumptions on preferences.

(i) Completeness {1 mark}

(ii) Reflexivity {1 mark}

(iii) Transitivity {1 mark}

(b) Otieno likes only peanut butter (b) and toasted bread (t), and he always eats each piece of toast with two teaspoon servings of peanut butter.

(i) Find Otieno's demand for peanut butter and toast given that Otieno's utility function is $u(b,t) = min\{\frac{b}{2}, t\}$, his income is M and the prices of peanut butter and toasted bread are P_b and P_t respectively {2 marks}

(ii) How much is Otieno's consumption of each good, if his income is KES 4,500 and the price of the peanut butter is KES 20, and the price of a toast is KES 60? {2 marks}

(iii) Suppose that the price of a toast rises to KES110. How will his consumption change?{2 marks}

(iv) How much should David's income be to compensate for the rise in the price of the toast? {2 marks}

(c) Consider the production function $y = x_1^a x_2^b$. If x_i is input i, state what would happen to the output y when the inputs are doubled if

(i) $a + b = 1$ {1 mark}

(ii) $a + b < 1$ {1 mark}

(iii) $a + b > 1$ {1 mark}

(d) Consider a monopolist whose output y is sold at KES$P(y)$ (price that is a function of output). If $MC = k$ is the monopolists marginal costs

(i) Show that the price charged by the monopolist will be a mark-up up and above the marginal costs {3 marks}

(ii) Use the findings in d[(i)] above to show the relationship between price elasticity of demand (PED) and the price charged by the monopolist for $|PED| > 1$ {2 marks}

(e) Consider the short run production function $y = x_1^{\frac{1}{3}} \bar{x}_2^{\frac{1}{3}}$. Find:

(i) Short run demand for input 1 if its price is w_1, x_2 is fixed at 8 units and the price of output is P. {2 marks}

(ii) Short run output level {1 mark}

(f) Way before the set-up of the Energy Regulatory Commission (ERC) at a rural village in Waytalib, there are only two customers, Hassan (who drives a 1985 Fiat lorry) and Ali (who drives a 2001 4X4 Toyota pickup). Hassan's demand for diesel is $Q_{Hassan} = 8000 - 200P$, while Ali's demand is $Q_{Ali} = 5000 - 100P$, where Q is measured in litres and P is the price per litre.

(i) Solve for the market demand equation for diesel at Waytalib {2 marks}

(ii) Draw a diagram showing the market demand curve for gasoline at Waytalib. {4 marks}

(g) Suppose that the daily wage rate is KES 33 per hour and the rental rate of capital is KES 73 per hour. Write an equation for the isocost curve. If l and k are the amounts of labour and capital hired and the desired cost outlay is c {2 marks}

[30 marks]

Question 2

(a) Odhiambo eats *omena* and *githeri* from his income of KES 200, when both *omena* and *githeri* cost KES 10. Odhiambo consumes 4 plates of *omena* and 16 plates of *githeri* (point A in Figure A). But when the price of *githeri* rises to KES 20 per plate, he consumes 12 plates of *omena* and 4 plates of *githeri*(point B).

(i) Why does the budget contrainst rotate as it does in response to the increase in the price of pies? {2 marks}

(ii) Trace the diagram to your answer booklet. On your diagram, separate the change in consumption of *githeri* into the substitution effect and the income effect. Which is larger? {6 marks}

(iii) Between *omena* and *githeri*, distinguish with reasons the inferior good and the normal good {2 marks}

(b) A firm in industrial area has the production function $Q = 20K^{0.2}L^{0.8}$, where Q measures output, K represents machine hours, and L measures labor hours. If the rental rate of capital is r = KES 1,500 and the wage rate is w= KES 200, and the firm wants to produce 40,000 units of output.

(i) What is the firm's cost minimising problem? {2 marks}

(ii) What is the cost-minimizing bundle of capital and labor? {6 marks}

(iii) What is the marginal cost of the firm? {2 marks}

[20 marks]

Question 3

(a) The short-run production function for a transport company is given by $Q = f(\bar{k}, \ell) = 25\bar{k}^{0.37}\ell^{0.63}$, where Q is the number of trips per hour and k is the number of buses (fixed at 5 in the short run), and ℓ is the number of workers (drivers and auxiliary staff) employed.

(i) Evaluate the short-run production function for the firm showing output as a function of labor. {2 marks}

(ii) Calculate the total output produced per hour for $\ell = 0, 3,$ and 5. {3 marks}

(iii) Illustrate what happens to the MP_ℓ as ℓ rises. What is the economic significance of this result? {5 marks}

(b) Kipchumba gets utility from consuming two goods, milk m and beans b. His utility function is given by

$$u(\text{milk, beans}) = \sqrt{(\text{milk, beans})} = m^{\frac{1}{2}}b^{\frac{1}{2}}$$

where m is the litres of milk he takes and b the servings of beans. Kipchumba's marginal utility of milk $MU_m = 0.5m^{-\frac{1}{2}}b^{\frac{1}{2}}$, and his marginal utility of beans $MU_b = 0.5m^{\frac{1}{2}}b^{-\frac{1}{2}}$. If Kipchumba's income is Y, and the prices of milk and beans are P_m and P_b, respectively.

(i) Find the expressions for Kipchumba's utility maximizing quantities of milk and beans in terms of Y, P_m and P_b {5 marks}

(ii) If Kipchumba's income is KES 6000, and the price of milk changes from KES 15 to KES 25. Decompose the total change in Kipchumba's demand for milk into the income and substitution effect {5 marks}

[20 marks]

Question 4

(a) A monopolist's faces the demand curve $Q = 2000 - 10P$, where Q is the output sold at price P per unit in KES. If the firms marginal cost is KES100

(i) Calculate the monopolists equilibrium price and quantity {3 marks}

(ii) Suppose the monopolist behaves competitively, how would the answer in 4[a(i)] above change {3 marks}

(iii) A monopolist is known to cause inefficiency, with the help of a well labelled diagram find the value of the dead weight loss due to this monopolist {6 marks}

(b) Given two consumers A and B with initial endowments $(W_A^1 W_A^2)$ for consumer A and $(W_B^1 W_B^2)$ for consumer B of good 1 and 2. Define:

(i) Edgeworth box {1 mark}

(ii) Feasible allocation {1 mark}

(iii) Pareto improvement point {2 marks}

(iv) Pareto efficient point {2 marks}

(v) Contract curve {2 marks}

[20 marks]

Question 5

(a) Consider a monopolist who faces two markets with demand curves given by

$$q_1(p_1) = 100 - p_1$$
$$q_2(p_2) = 100 - 2p_2$$

(i) State the conditions necessary conditions for the monopolist to price discriminate {3 marks}

(ii) Given that the conditions in (a) above hold what would be the profit maximizing prices, given that the marginal costs are constant at KES20. {6 marks}

(iii) Suppose that the conditions stated in 5(a) above fail to hold what would be the profit maximizing price given that the marginal costs remain constant at KES20. {3 marks}

(b) Consider a market comprising of two firms, Firm A and Firm B, and a choice of two strategies for each: advertise or don't advertise. If both firms advertise, Firm A gets a payoff of 4 while B gets a payoff of 3. If Firm A advertises and B doesn't Firm A gets a payoff of 5 and B a payoff of 1. If Firm A does not advertise but B advertises firm A gets a payoff of 2 while B gets a payoff of 5. If both firms do not advertise, Firm A gets a payoff of 3 while B gets a payoff of 2. Required:

(i) Represent the possible outcomes of this game using a payoff matrix {2 marks}

(ii) Find firms A's dominant strategy {2 marks}

(iii) Find firm B's dominated strategy {2 marks}

(iv) Find the equilibrium of this advertising game {2 marks}

[20 marks]

Best of luck! ☺