(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

SCHOOL OF BUSINESS AND ECONOMICS

SECOND SEMESTER EXAMINATIONS

PHD ECONOMICS

MAIN EXAM

COURSE CODE: ECO 905

COURSE TITLE: ADVANCED MICROECONOMICS

DATE: FRIDAY 26th April 2024 TIME: 2:00-5:00

INSTRUCTIONS TO CANDIDATES

Attempt Question One and any other Three Questions

TIME ALLOWED: 3 Hours

MMUST observes ZERO tolerance to examination cheating

QUESTION ONE [COMPULSORY]- 40 MARKS

QUESTION ONE

A. Suppose $U(x, y) = 4x^2+3y^2$.

i. Calculate $\partial U/\partial x$, $\partial U/\partial y$. (5marks)

ii. Evaluate these partial derivatives at $x=1$, $y=2$. (4marks)

iii. Calculate dy/dx for $dU=0$, what is the implied trade-off between x and y holding U constant? (4marks)

iv. Show $U=16$ when $x=1$, $y=2$. (3 marks)

B. Consider a simple quasi-linear utility function of the form U(x, y) = x + ln y.

i. Calculate the income effect for each good. Also calculate the income elasticity of demand for each good (4marks)

ii. Calculate the substitution effect for each good. Also calculate the compensated own-price elasticity of demand for each good (4marks)

iii. Show that the Slutsky equation applies to this function. (3marks)

iv. d. Show that the elasticity form of the Slutsky equation also applies to this function. (3marks)

v. Explain the hotteling lemma process (10 marks)

QUESTION TWO

Consider the following constrained maximization problem:

A) Maximize $y = x_1 + 5 \ln x_2$

Subject to $k-x1-x_2 = 0$,

i. Show that if k=10 (4marks)

ii. Show that solving this problem for k=4 requires that $x_1=-1$ (3marks)

iii. If the x's in this problem must be nonnegative, what is the optimal solution when k=4? (3marks)

B) Consider the following utility functions:

i. $U(x, y) = x^2y^2$

Ii $U(x, y) = \ln x + \ln y$

Show that each of these has a diminishing MRS but that they exhibit constant, increasing, and decreasing marginal utility, respectively. What do you conclude?

(10marks)

QUESTION THREE

Suppose there is a 50–50 chance that a risk-averse individual with a current wealth of $20,000 will contract a debilitating disease and suffer a loss of $10,000.

a. Calculate the cost of actuarially fair insurance in this situation

b. Suppose two types of insurance policies were available:

(i) A fair policy covering the complete loss; and

(ii) A fair policy covering only half of any loss incurred.

Calculate the cost of the second type of policy and show that the individual will generally regard it as inferior to the first. (10marks)

C. Two neighboring homeowners, i =1, 2, simultaneously choose how many hours l_i to spend maintaining a beautiful lawn. The average benefit per hour is $10-l_i + lj/2$ and the (opportunity) cost per hour for each is 4. The homeowner i's average benefit is increasing in the hours neighbor j spends on his lawn, since the appearance of one's property depends in part on the beauty of the surrounding neighbourhood.

a. Compute the Nash equilibrium.

b. Graph the best-response functions and indicate the Nash equilibrium on the graph also show how the equilibrium would change if the intercept of one of the neighbor's average benefit functions fell from 6 to some smaller number.

(10marks)

QUESTIONS FOUR

The Acme Heavy Equipment School teaches students how to drive construction machinery. The number of students that the school can educate per week is given by **$q = 10 \min (k,l)^{r}$**

Where; k is the number of backhoes the firm rents per week, l is the number of instructors hired each week, and γ is a parameter indicating the returns to scale in this production function.

a. Explain why the development of a profit-maximizing model here requires $0 < \gamma < 1$.

b. Supposing $\gamma=0.5$, calculate the firm's total cost function and profit function.

c. If v=1000, w=500, and P=600, how many students will Acme serve and what are its profits?

d. If the price students are willing to pay rises to P=900, how much will profits change?

e. Graph Acme's supply curve for student slots, and show that the increase in profits calculated in part (d) can be plotted on that graph. (20marks)

QUESTION FIVE

A perfectly competitive industry has a large number of potential entrants. Each firm has an identical cost structure such that long-run average cost is minimized at an output of 20 units ($q_i=20$). The minimum average cost is \$10 per unit.

Total market demand is given by Q=1,500 - 50P.

a. What is the industry's long-run supply schedule? (5marks)

b. What is the long-run equilibrium price P*? The total industry output Q*? The output of each firm q*? The number of firms and the profits of each firm?

(5marks)

c. The short-run total cost function associated with each firm's long-run equilibrium output is given by

$C(q)=0.5q^2-10q+200$

i. Calculate the short-run average and marginal cost function. At what output level does short-run average cost reach a minimum? (5marks)

ii. Calculate the short-run supply function for each firm and the industry short-run supply function. (5marks)

QUESTION SIX

a). With the help of a well labelled diagram, explain the inefficiency of monopoly (5marks)

b). Briefly explain Shephard – Lemma model (5 marks)

c). Draw an edgeworth box example with an infinite number of prices that are Walrasian equilibria. (10 marks)