

LAIKIPIA



UNIVERSITY

UNIVERSITY EXAMINATIONS

2ND SEMESTER 2023/2024 ACADEMIC YEAR

THIRD YEAR EXAMINATION FOR THE DEGREE
BACHELOR OF SCIENCE IN ECONOMICS AND
STATISTICS

ECON .323: ADVANCED MICROECONOMICS II

STREAM: *ECON/STAT*

TIME: *2 HRS*

DAY: *FRIDAY [11.30-1.30 P.M]*

DATE: *12/04/2024*

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

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INSTRUCTIONS

- i. Answer Question ONE and any other TWO Questions
- ii. Do not write on the Question Paper
- iii. Show your working clearly

QUESTION ONE (30 MARKS)

(a) Four Firms are competing sequentially on product innovation.

Firm 1 can either innovate product A or B.

Firm 2 observes the move of Firm 1 and will innovate product C or D($U = (1,7,-2,3)$) if Firm 1 innovates product A and it will innovate product C or E if Firm 1 innovates Product B.

Firm 3 will observe the move of Firm 2 and either innovate product K($U = (5,6,7,2)$) or L($U = (2,4,8,-3)$) if Firm 2 innovates product C.

Firm 4 will observe the move of Firm 2 and either innovate Product G($U = (-1,2,4,7)$) or V($U = (2,1,0,4)$) if Firm 2 innovates Product C **OR** innovate product G($U = (8,3,-3,9)$) and for product V ($U = (-2,1,2,7)$) if Firm 2 innovates Product E.

Note: $U = \text{utility}$ and $U = (1,2,3,4)$ is utility for Firm 1, Firm 2, Firm 3 and Firm 4 respectively.

Required

- i. Represent the game in an extensive form **(12 Marks)**
- ii. Determine the Nash Equilibrium for the four Firms **(8 Marks)**

(b) Suppose a competitive industry consists of m identical firms, each with a cost function;

$$C(y) = y^2 + 1. \text{ Suppose also that market demand is given by } P = 100 - Y.$$

Required

Calculate the equilibrium number of firms in the market. **(10 Marks)**

QUESTION TWO (20 MARKS)

- a) Briefly explain the following oligopolistic models



- i) Cournot model (2 Marks)
 ii) Bertrand model (2 Marks)
 iii) Stackelberg model (2 Marks)
 iv) Price leadership (2 Marks)
- b) Safaricom and Airtel are competing in setting quantity simultaneously. They are faced with the following demand and marginal constant cost function and no fixed cost

$$P = 63 - 4Q$$

$$TC = 15Q$$

Required

- i. Derive Safaricom and Airtel Best Response Reaction functions. (4 Marks)
 ii. Obtain the Nash Equilibrium Quantity and Price (4 Marks)
 iii. Obtain Profit for each firm and the mobile Industry profit (4 Marks)

QUESTION THREE (20 MARKS)

The following simplistic model has been developed to explore the issues raised by the current controversial debate about cigarette advertising, where anti-smoking advocates would like cigarette advertising to be banned while tobacco companies argue that advertising merely affects people's choice of brands, and not the overall level of smoking, and hence cigarette advertising should not be banned.

Model

There are two firms that play the following 2 stage game. In stage 1, they simultaneously choose the amount of money each will spend on advertising. In stage 2, having observed the advertising levels, the firms choose the quantities that they will sell.

Assuming that there is no discounting between periods, and no further activity after stage 2.

The demand curve faced by each firm in stage 2 is given by;

$$P_i = 100 + A_i - A_j - (Q_i + Q_j)$$

Where; $A_i + A_j$ are firms i 's and J 's advertising presence and

Q_i & Q_j , their outputs respectively



The cost of a given level of advertising presence is $C(A) = 0.5A^2$. The marginal cost of producing cigarettes is zero.

Required

- a) Find the Nash equilibrium of this game, showing
- i. The advertising levels by each firm in the first stage. **(5 Marks)**
 - ii. The quantities sold by each firm in the second stage. **(5 Marks)**
 - iii. The profit earned by each firm overall. **(5 Marks)**
- b) Would these firms oppose a government ban on advertising? Explain fully. **(5 Marks)**

QUESTION FOUR (20 MARKS)

Given two Individuals with fixed amounts of goods x and y , i.e. \bar{x} & \bar{y} , with the following Objective and constraints.

$$\begin{aligned} \text{Max } U_1(x_1) + y_1 \quad s.t \quad & 1. U_2(x_2) + y_2 = \bar{U} \\ & 2. x_1 + x_2 = \bar{x} \\ & 3. y_1 + y_2 = \bar{y} \end{aligned}$$

Required

maximize social welfare using

- a) Lagrangian approach **(10 Marks)**
 b) Substitution approach **(10 Marks)**

QUESTION FIVE (20 MARKS)

- a) Assuming identical product production, give reasons whether it is possible for duopoly Firms competing in price simultaneously to charge higher prices. **(3 Marks)**
- b) Proof your answer above by contradiction. **(17marks)**