EGT2
ENGINEERING TRIPOS PART IIA

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Thursday 5 May 2022   2 to 3.40

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Module 3E1

BUSINESS ECONOMICS

*Answer not more than **two** questions.*

All questions carry the same number of marks.

*The **approximate** percentage of marks allocated to each part of a question is indicated in the right margin.*

*Write your candidate number **not** your name on the cover sheet.*

STATIONERY REQUIREMENTS
Single-sided script paper

SPECIAL REQUIREMENTS TO BE SUPPLIED FOR THIS EXAM
CUED approved calculator allowed

10 minutes reading time is allowed for this paper at the start of the exam.

You may not start to read the questions printed on the subsequent pages of this question paper until instructed to do so.

You may not remove any stationery from the Examination Room.

1   The following is based on excerpts from *"How much will a COVID-19 vaccine cost? Pricing of all vaccine deals shrouded in secrecy"*, *Financial Times, October, 22, 2020*.

The race for a coronavirus vaccine has stoked a debate on how much the doses will cost and who will pay for them, as prices range from US$3 to more than US$30 a dose and public health advocates including Bill Gates' call for a price cap for poor countries.

The pricing of all vaccine deals has been shrouded in secrecy, with companies and public institutions defending their right to confidentiality. But people briefed on talks between drugmakers and the European Commission say that AstraZeneca Plc. has sold its jabs at about US$3 to US$4 per dose in deals with the EU, while the vaccines developed by Johnson & Johnson and Sanofi SA/GlaxoSmithKline Plc. have come in at about US$10 per dose. By contrast, Moderna Inc. — a newer and still loss-making company — has sought to pitch its vaccine at about US$25 to US$30 per dose, after initially asking for almost double that amount. Other biotechnology businesses, such as CureVac BV, have said they would seek an "ethical margin" on their prices. One of China's vaccine front-runners, Sinovac Biotech Ltd., this week began selling its vaccine in selected cities at US$30 per dose as part of an emergency use program with hundreds of thousands of participants. Some manufacturers in countries such as India, which has a large drug production industry, have criticized western drug companies that they see as trying to prop up prices, by failing to ramp up production to meet demand.

"They don't want to give it to the rest of the world because they'll have to compete with me at US$3 (a dose)," said Adar Poonawalla, chief executive of India's Serum Institute, the world's largest vaccine manufacturer. "We're making a small margin but that's just normal business," he said. He added that higher production costs in Europe did not justify the difference in price between his company's products and those of some western vaccine producers.

At the heart of the discussion lies a question both ethical and practical: whether pharmaceutical corporations should work with rich countries to ensure charges to poor nations are capped. According to Bill Gates, "The price [of a covid vaccine dose] needs three tiers where rich countries are paying back a lot of the fixed costs, middle-income countries are paying back some of the fixed costs and the poorer countries are paying a true marginal cost."

(a) Characterise this industry with respect to market structure, costs, barriers to entry and product characteristics. [10%]

(b) Discuss models that could explain pricing behaviour adopted by firms in this industry. [50%]

(c) Evaluate Bill Gates' proposal in terms of feasibility, implementation and impact for consumers, producers and society overall. [40%]

2 (a) The demand for organic yogurt for a monopoly firm has been estimated according to the following linear regression model, where lnX stands for the natural logarithm of variable X:

$$lnQ = 7 - 1.4\, lnP + 1.8\, lnA + 0.1\, lnM$$

std errors: (5.2) (0.45)   (2.2)   (0.04)

Q is quantity demanded of yogurt, P is price of yogurt, A is advertising and M is income. The marginal cost of producing the yogurt is £0.5. The standard errors are given in parenthesis below each estimate. Interpret the results. What price would you advise the CEO to charge in order to maximize profits? Explain. [20%]

(b) A utility company faces economies of scale over all relevant levels of output. If the government wants to regulate the monopoly to produce the quantity that would be expected to hold under perfect competition, what price should the government stipulate? Include a diagram in your answer. [30%]

(c) The 'invisible hand' is an old-fashioned idea of how markets should function. Discuss. [50%]

3   (a)   Two firms play a Cournot game. The market demand is given by $P = 150 - Q$, where Q is the total quantity produced by firm 1 and firm 2. The marginal cost (MC) for each firm is equal to 30.

     (i)   Construct a 2x2 game matrix as in Fig.1 below having firm's profits as payoffs (i.e. matrix entries) assuming that the choices for each firm are either to collude (i.e. form a cartel) or to compete with the other firm. Determine the Nash Equilibrium. Is this game a prisoner's dilemma? Explain.

Firm 2

Collude   Compete

Firm 1
Collude
Compete

[30%]

Fig. 1

     (ii)   What would happen if the game was played sequentially instead? Determine the profits for each firm and explain your findings.   [30%]

(b)   The COP26 summit held in in Glasgow in November last year brought parties together to accelerate actions towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. Explain why air pollution is a challenging economic problem and discuss how bargaining may offer a potential solution.   [40%]

END OF PAPER