KEELE UNIVERSITY

MOCK EXAMINATION PAPER

ECO 20015

MANAGERIAL ECONOMICS II

Candidates should attempt TWO questions. Each question carries equal marks.

When presenting numerical results, please give a complete step-by-step presentation of your derivations. All mathematical derivations should be accompanied by brief explanatory remarks and interpretations.

ECO 20015: MANAGERIAL ECONOMICS II

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1. What are Porter's five forces? Explain the importance of different types of barrier to entry for the profitability of an industry. Discuss the types of strategy that firms might employ to increase the barriers to entry.

2. An ice-cream seller in a seaside town sells to locals and tourists. The demand for tourists is given by $D_T(p) = 120(5 - p)$ provided $p \leq 5$ where p is the price. The demand from locals is $D_L(p) = 180(3 - p)$ provided $p \leq 3$. The seller has a constant marginal cost of 0.5.

   (a) Suppose the ice-cream seller can set different prices in the two markets. Calculate the profit maximising values of sales, prices and profit. [**10 marks**]

   (b) Now suppose that the ice-cream seller is constrained by a law to set the same price for both tourists and locals. Find the profit maximising sales, prices and profit in this case. Explain who benefits and who loses from price discrimination in this example. [**10 marks**]

   (c) Outline the different types of price discrimination (first, second and third degree) in which firms might be able to engage. In what type of price discrimination is the ice-cream seller engaging in part (a) of the question? [**15 marks**]

   (d) Assess the types of difficulty firms face in engaging in price discrimination and the methods that they might use to overcome these difficulties. [**15 marks**]

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3. There are two monopolies, one produces copper and one produces zinc. These two monopolies supply a large number of different brass produces (there is free entry and exit into the brass industry). Brass producers require one ton of copper and one ton of zinc to produce one ton of brass (these proportions are fixed and do not depend on how much brass is produced). No other inputs are needed (this is for simplicity). Let p_c be the price the brass companies must pay for a ton of copper and p_z the price for a ton of zinc. Since there are a large number of brass producers and free entry and exit, the price of brass per ton will just equal the cost of production, $p_b = p_c + p_z$. Suppose the demand for brass is $x = 90 - \frac{p_b}{10}$. Thus if x units of brass are sold, then brass companies demand exactly x tons of copper and x tons of zinc. Suppose (again for simplicity) that there are no costs of production for copper or zinc (more precisely that the marginal costs of an extra ton are always zero).

(a) The copper firm will choose p_c to maximise profits taking p_z as given. Find the value of p_c (as a function of p_z) which maximises profits. Similarly find the price p_z the zinc ore firm will choose (as a function of p_c) to maximise its profits. [**10 marks**]

(b) From the two equations derived in part (a) find the values of p_c and p_z that maximise profits. Calculate the profits of the two firms. [**10 marks**]

(c) Now suppose the copper firm and the zinc firm merge to form a single monopoly. Find the values of p_c and p_z that maximize the profits of the merged firm. Are the profits of the merged firm greater than the sum of the profits of the two firms when they acted separately? Are consumers (of brass) better or worse off? [**10 marks**]

(d) What is the (intuitive) explanation for your answer to part (c)? [**10 marks**]

(e) A merger is just one way for the two firms to co-ordinate on pricing policy. Are there other ways in which the copper and zinc monopolies can increase their profits? [**10 marks**]

4. Suppose there are used cars worth every price from £1,000 to £3000 to *new* owners, with each price equally likely. Suppose that a car worth x to a new owner is worth $0.75x$ to its current owner. Suppose that there is a finite supply of cars at each price, while there is a much larger number of potential buyers.

   (a) Suppose the quality of cars is known to buyers and sellers. Determine the equilibrium in this market for used cars. [**10 marks**]

   (b) Now suppose the quality of the car is unknown to potential buyers. Calculate the equilibrium price and average quality of cars sold. Which cars are sold and which are not? [**10 marks**]

   (c) Explain why the equilibrium in your answer to part (b) is inefficient. [**10 marks**]

   (d) Discuss the remedies that may be available to alleviate the inefficiency in the market. [**10 marks**]

   (e) Explain the difference between signalling and screening in models with hidden information. Why do problems of multiple equilibria arise in signalling models? [**10 marks**]

5. (a) Explain how reputation can make threats and promises credible. What other strategies can firms adopt to make credible threats or promises? [**20 marks**]

   (b) Explain how firms might use reputation to enhance profits. [**15 marks**]

   (c) Discuss the role of observability and ambiguity in maintaining reputations. [**15 marks**]

END

ECO-20015 - MANAGERIAL ECONOMICS II
REVISION QUESTIONS

1. A steel company can sell its steel domestically or export on the world market. Domestically it is the only steel company and all imports of steel are prohibited. Suppose that the price at which the steel company can sell its steel domestically if it sells x units is

$$P(x) = 1000 - \frac{x}{250}.$$

Suppose the firm's total cost function is

$$TC(x) = 10,000,000 + 200x + \frac{x^2}{1000}.$$

Suppose that if it exports, the price it gets per ton is the constant world price of 375 which is unaffected no matter how much it sells.

   (a) Find the average cost function and the minimum average cost. [**10 marks**]

   (b) How much would the firm produce if it sold only domestically? Explain why you have found a maximum and not a minimum. [**15 marks**]

   (c) How much should the firm export if it is to maximise profits? How much does it sell domestically in this case. [**15 marks**]

   (d) Explain why the firm benefits from exporting even though the price it receives is lower than the minimum average cost. [**10 marks**]

2. An internet service provider (ISP) sells access to the internet. It faces a inverse demand curve from consumers of the form $P(x) = 400 - x$. It buys phone line access from a telephone company (BT). The marginal costs for both the ISP and BT are zero.

   (a) If BT charges the ISP a price of p per unit, how many units will the ISP choose to maximize its profits? Calculate the price P (as a function of p) the ISP charges and its maximum profit (again as a function of p). [**10 marks**]

(b) Given the quantity that the ISP will provide, calculate how BT will choose the price p to maximise its profits. Calculate the quantity consumed, the price paid by consumers and the profits of BT and the ISP. [**10 marks**]

(c) If BT charges a two-part tariff with a fixed fee F as well as the fixed rate per unit p, calculate the two-part tariff which would maximise the BT's profits. Are consumers better or worse off? [**10 marks**]

(d) Explain the problem of *double marginalisation*. Illustrate with a diagram and reference to the above example. [**10 marks**]

(e) The two-part tariff used by the BT in this example is sometimes referred to as a *vertical restraint*. Give examples of other types of vertical restraint. Are vertical restraints good or bad for welfare? [**10 marks**]

3. An ice-cream seller in a seaside town sells to locals and tourists. The demand for tourists is given by $D_T(p) = 120(5 - p)$ provided $p \leq 5$ where p is the price. The demand from locals is $D_L(p) = 180(3 - p)$ provided $p \leq 3$. The seller has a constant marginal cost of 0.5.

(a) Suppose the ice-cream seller can set different prices in the two markets. Calculate the profit maximising values of sales, prices and profit. [**10 marks**]

(b) Now suppose that the ice-cream seller is constrained by a law to set the same price for both tourists and locals. Find the profit maximising sales, prices and profit in this case. Explain who benefits and who loses from price discrimination in this example. [**10 marks**]

(c) Outline the different types of price discrimination (first, second and third degree) in which firms might be able to engage. In what type of price discrimination is the ice-cream seller engaging in part (a) of the question? [**15 marks**]

(d) Assess the types of difficulty firms face in engaging in price discrimination and the methods that they might use to overcome these difficulties. [**15 marks**]

4. Suppose that in a perfectly competitive industry the total cost for each firm is
$$TC(x) = 10,000,000 + 2x + \frac{x^2}{100,000}.$$
Demand is given by $D(p) = 500,000(42 - p)$.

   (a) Assume that fixed costs are avoidable. Find the supply function for an individual firm. [**10 marks**]

   (b) If the industry consists of six firms, what is the equilibrium price and quantities? (Ignore entry and exit). [**10 marks**]

   (c) Now suppose there is free entry and exit, what is the equilibrium? [**5 marks**]

   (d) Suppose that demand changes to become $\hat{D}(p) = 500,000(46-p)$. What happens to the equilibrium (i) in the very short-run where output is fixed, (ii) in the intermediate-run when the number of firms is fixed but firms adjust their supply and (iii) in the long-run when there is free entry and exit. [**15 marks**]

   (e) Explain the differences between economic profit, economic rent and accounting profit. [**10 marks**]

5. What are Porter's five forces? Explain the importance of different types of barrier to entry for the profitability of an industry. Discuss the types of strategy that firms might employ to increase the barriers to entry.

6. Suppose there are used cars worth every price from £2,000 to £3000 to *new* owners, with each price equally likely. Suppose that a car worth x to a new owner is worth $x - 100$ to its current owner. Suppose that there is a finite supply of cars at each price, while there is a much larger number of potential buyers.

   (a) Suppose the quality of cars is known to buyers and sellers. Determine the equilibrium in this market for used cars. [**10 marks**]

   (b) Now suppose the quality of the car is unknown to potential buyers. Calculate the equilibrium price and average quality of cars sold. Which cars are sold and which are not? [**10 marks**]

   (c) Explain why the equilibrium in your answer to part (b) is inefficient. [**10 marks**]

(d) Discuss the remedies that may be available to alleviate the inefficiency in the market. [**10 marks**]

(e) Explain how the problem of adverse selection can affect the equilibrium in the market for health insurance. [**10 marks**]

7. There are two types of workers, high productivity types and low productivity types. High productivity workers can produce £40 of output per hour net of any other production costs. Low productivity workers produce only £20 per hour. Employers are initially unable to distinguish between the two types, but they know that 50% of the working population are high productivity and 50% are low productivity. Workers can undertake education. The cost of gaining some education level, x, in hourly wage equivalent is $c_H x$ for high productivity workers and $c_L x$ for low productivity workers. Hence a worker with an hourly wage of w, and an education level x, has a net payoff of $w - c_i x$, for $i = H, L$. Firms are perfectly competitive.

(a) Suppose that employers believe that if $x < x^*$ then the worker is a low productivity type and if $x \geq x^*$ then the worker is a high productivity type. Write down the *participation constraint* for the employer given his beliefs and draw the wage schedule $w(x)$ where the employer makes no profits. [**10 marks**]

(b) Suppose that high productivity workers choose an education level x_H and low productivity workers an education level x_L. Write down the *self-selection constraints* for both types (such that each type prefers the wage and education level of its type rather than the other type). Suppose that $c_H = 10$ and $c_L = 20$. Show that $x_H = x^* = 2$, $x_L = 0$ is a separating equilibrium. Are there other separating equilibria? [**10 marks**]

(c) Suppose again that $c_H = 10$ and $c_L = 20$. Find the values of x^* such that $x_H = x_L = 0$ is a pooling equilibrium (i.e. determine the value of x^* such that the high ability type will not prefer to choose the education level x^* and get the wage appropriate to high ability workers). [**10 marks**]

(d) Continuing to suppose that $c_H = 10$ and $c_L = 20$, which is the best separating equilibrium for the workers? Would they prefer a pooling equilibrium? [**10 marks**]

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(e) Briefly explain the similarities and differences between signalling and screening. [**10 marks**]

8. Santa's chief elf, Ed, is responsible for choosing which of two different production processes are used for manufacturing toys. There is always some randomness (magic) involved in the production processes which means that sometimes more toys can be produced than at others. To be specific suppose that for each production process there is a 50% chance that it will be productive. Moreover, these probabilities are independent so the probability that neither are highly productive is 25%. Thus if Ed picks one process at random, there will be a 50% change the process is productive. He can however, investigate and find out whether the processes are productive or not. (If he investigates, he investigates both processes - he can't just check just one.) Thus if he does investigate then the probability that neither is highly productive is just 25% and there is a 75% chance he can pick the highly productive process. Now Ed is not dysfunctional, if he sees the better production process, he will choose it, however he is incorrigibly lazy and gets 20 units of disutility from investigating the productivity of the production processes. He also gets a great deal of utility from the chocolate that Santa pays him. However, he knows that eating chocolate has diminishing marginal utility. Thus Ed's utility function is

$$\sqrt{c} - \text{disutility of effort}$$

where c is the chocolate he is paid and the disutility of effort is 20 if investigates and 0 if he doesn't. Ed's reservation utility is 100. That is he will quit the North Pole unless his expected utility is at least 100. Santa is, *of course*, risk-neutral. Currently Ed's contract pays a fixed amount of chocolate $c = 10,000$ independent of how may toys are produced. Santa is however, think of paying him a base chocolate salary of B with a bonus of N also paid in chocolate in order to give him an incentive to investigate the productivity of the processes before choosing one.

(a) If $B = 6400$ and $N = 13,200$ will Ed be motivated to investigate to find out if there is a low technology available? [**10 marks**]

(b) Which combination of B and N will give Ed just sufficient incentive to investigate and just prevent him from leaving Santa's

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employment. (You may wish to let $x = \sqrt{B+N}$ and $y = \sqrt{B}$ and solve for x and y first.) [**15 marks**]

(c) Explain why this is an optimal incentive contract if Santa wishes Ed to investigate. Under what conditions will Santa wish Ed to investigate? [**15 marks**]

(d) What further issues arise if Santa has to motivate a group of elves rather than just the chief Elf Ed, as in the example. [**10 marks**]

9. (a) Outline the *Coase Conjecture* for durable goods monopolists. [**10 marks**]

(b) How might monopolists act to avoid falling foul of the Coase conjecture? [**20 marks**]

(c) Discuss the difficulties a monopolist might face from potential entrants and customers with bargaining power. Consider the strategies the monopolist might use to overcome these difficulties. [**20 marks**]

10. Ant and Dec play a trust game. If Dec trusts Ant, then either Ant can abuse Dec's trust and reap a larger payoff or she can treat Dec fairly and get a slightly smaller payoff. Suppose that if Ant treats Dec fairly both get a payoff of 3. However, if Ant abuses Dec's trust he gets a payoff of 25 and Dec gets a payoff of -6. If Dec doest trust Ant if the first place then they both get a payoff of 0.

(a) Draw this game in extensive form. [**5 marks**]

(b) Explain why Ant's promise to treat Dec fairly is not credible. What is the outcome of the game? [**5 marks**]

(c) Suppose that Ant and Dec may be in a similar game in the future. In particular suppose there is always a probability of 0.9 that they will play the same game again next period and that payoffs from this overall game by using the expected value. Suppose further that Dec decides to trust Ant on the first round and continues to trust her as long as she treats him fairly, but will never trust her again if she abuses his trust. Suppose further that Ant treats Dec fairly on the first round and continues to do so unless she ever abuses his trust in which case she continues to abuse his trust in all subsequent situations. Show that these two strategies for Ant

and Dec constitute a Nash equilibrium. Is Ant's promise to treat Dec fairly now credible? [**20 marks**]

(d) Find the probability of continuation that just makes Ant's promise credible. [**10 marks**]

(e) What other strategies might Ant use to make his promise credible? [**10 marks**]