Department of Economics

University of Delhi

M.A. Economics: Semester II, 2014

005: Markets, Institutions and Economic Growth

Maximum Marks: 70. Time: $2\frac{1}{2}$ hours

Instructions

1. There are two sections, answer both.
2. Each section must be answered in a separate answer book.
3. Write Section A or Section B clearly on the front page.

Section A

[Attempt as many as you wish and all answers will be graded. However, the maximum that you can score in Section A is 35.]

1. A firm's production function is given by

$$Q(L) = L(100 - L) \text{ if } L \leq 50 \text{ and } Q(L) = 2500 \text{ if } L > 50$$

where L is the number of workers. The price of output is 1. A union that represents workers presents a wage demand (a nonnegative real number w), which the firm either accepts or rejects. If the firm accepts the demand, it chooses L (a nonnegative real number, not necessarily an interger); if it rejects the demand, no production takes place ($L = 0$). The firm's preferences are represented by its profit whereas the union's preferences are represented by the total wage bill, wL.

a) Find the subgame perfect equilibria of the above game. [6]

b) Is there a outcome of the game which is Pareto superior to any subgame perfect equilibrium outcome? What is the maximum joint surplus of this game? [2]

c) Is there a Nash equilibrium of this game, where the firm keeps the entire joint surplus. Explain. [4]

2. Consider an 'offer-counteroffer bargaining game' of T periods. Suppose that the players are bargaining over a pie of size 1 and have common discount factor δ. Compute the subgame perfect equilibrium of this game. [8]

3. Consider the following game.

	L	R
U	3,3	0,4
D	6,0	1,1

a) Find the Nash equilibrium and the minmax payoff. [4]

b) Suppose that the above game is repeated for infinitely many periods. In a diagram, sketch the set of payoffs that can be sustained as subgame perfect equilibrium of the above infinitely repeated game. Does it include the minmax payoff? Explain. [6]

c) Let $\delta < 1$ be the common discount factor. A 'tit-for-tat' strategy can be described as follows.

Row player: At period 1 play U. At period t, play U if the column player has played L in period $t-1$ and play D otherwise.

Column player: At period 1 play L. At period t, play L if the row player has played U in period $t-1$ and play R otherwise.

Is 'tit-for-tat' a Nash equilibrium? Explain. [4]

d) Find the minimum value of δ that will allow the existence of a subgame perfect equilibrium in which the players play (U, L) along the equilibrium path. [6]

Section B

[Answer any two questions. Each question carries $17\frac{1}{2}$ marks]

1. Consider a Cournot duopoly operating in a market with inverse demand $P(Q) = a - Q$, where $Q = q_1 + q_2$ is the aggregate quantity on the market. Both firms have total costs $c_i(q_i) = c.q_i$, but demand is uncertain: it is high, $a = a_H$, with probability θ and low, $a = a_L$, with probability $(1 - \theta)$. Furthermore, information is asymmetric: firm 1 knows whether demand is high or low, but firm 2 does not. All of this is common knowledge. The two firms simultaneously choose quantities. What are the strategy spaces for the two firms? Make assumptions concerning a_H, a_L and c such that all equilibrium quantities are positive. What is the Bayesian Nash equilibrium of this game?

2. Consider a risk neutral landlord who wants to lease out a plot of land to a tenant. The tenant can be of two types: high ability and low ability. The tenant knows her true type. The landlord does not know the true type of the tenant but it only has a prior belief that with probability p tenant can be of high ability and with probability $(1-p)$ the tenant can be of low ability. The high ability tenant produces an output of Rs. Q_H and the low ability tenant produces an output of Rs. Q_L ($Q_H > Q_L$). The tenant has a reservation payoff of Rs. w. The landlord has the option of either writing a fixed rent contract or a combination of fixed rent and share contract. What would be the optimal payoff to the landlord when the landlord writes only a fixed rent contract? What would be the optimal contract for the landlord when he can specify both a fixed rent and a share of the output in the contract?

3. Suppose there are two types of firms. The current assets of the firm are worth either H or L ($H > L$). Firm's types are known to the managers whose objective is to maximize the value of the current shareholders claim. Outside investors believe that the firm is of type H with probability p and type L with probability $(1-p)$. Both types of firms have access to a new project that requires investment of I and generates a return of R . I and R are assumed

to be common knowledge. The potential investors have a competitive rate of return r from investing elsewhere. Assume that $(R - I(1 + r)) > 0$. The firm must decide whether to undertake the project or pass up. If the project is accepted, the investment I must be financed by issuing equity to new shareholders. Derive the conditions for pooling and separating equilibrium in this context.