EE853: Major **07-May-2007**
Full Marks: 25

Please be brief and to the point ... Best of luck!

You may need to use Rubinstein's bargaining solution somewhere ...

$$x^* = \left(\frac{1-\delta_2}{1-\delta_1\delta_2}, \frac{\delta_2(1-\delta_1)}{1-\delta_1\delta_2}\right) \quad y^* = \left(\frac{\delta_1(1-\delta_2)}{1-\delta_1\delta_2}, \frac{1-\delta_1}{1-\delta_1\delta_2}\right)$$

1. a) Explain Vickery Auction with an example. 2

   b) In Vickery auction
   - Is there a dominant strategy for the buyer agent? If yes, what is it? 1
   - Can it be manipulated by dishonest auctioneer? If so, how? 1
   - Does it produce Pareto-efficient outcome? Explain how. 1

2. Suppose, two neighboring countries, India and Pakistan, embarks on a joint Mars mission. They need to share a single communication antenna on the spacecraft to send experimental data home. Total bandwidth of the antenna is 10 channels of 64kbps each. The bandwidth can be shared in integral number of channels only. Two agents, on behalf of the two countries, start negotiating a deal. None of the countries can use the communication antenna till a deal has been struck. Assume that both countries have constant discount rates of 0.9 for the utility of the channels.

   Assuming the agents to be rational

   a) Will the two countries be able to reach a deal, and if so will there be an upper bound on negotiation cycle? Justify your answer. 3

   b) If India is privileged to make the first offer, what is the offer it should make in the first round? 2

... Please turn over

3. Two siblings, a brother and a sister (quite young), went for a birthday party of their common friend and got separated from each other. Each of them has the option of waiting for his brother / sister or to come home alone. Both of them are sleepy and want to go to bed early. However, the brother has the moral responsibility of accompanying her sister back.

   a) If they wait for each other and come home together, both get delayed. The sister's payoff is 30 and the brother's payoff is 50 (he has accompanied her sister home) in this scenario.

   b) If the sister comes home without waiting for her brother and the brother keeps on waiting, the sister goes to bed early and gets a payoff of 40. The brother gets late and cannot discharge his duty of bringing her sister home. His payoff is 10 in this case.

   c) If the brother comes home without waiting for the sister and the sister waits, she gets late and her payoff is 15. The brother comes home early but cannot discharge his duty. In this case, his payoff is 30.

   d) If both them decide not to wait for each other and come home on their own, they will start fighting with each other on reaching home and both will be late for bed. Moreover, they will be reprimanded by their parents for fighting. The payoff for the sister is 20 in this case. The brother's payoff is 15 (he did not bring her sister home).

   Assume that the brother and the sister know each other's payoffs in all possible circumstances to answer the following questions.

   a) Which of the outcomes maximize social welfare? 2
   b) Which of the outcomes are Pareto-Efficient? 2
   c) Is there a dominant strategy for the brother and/or the sister (to wait or not to wait)? 3
   d) Is there a strategy pair in Nash equilibrium? 3
   e) What will be the rational decision for the brother and for the sister? 2
   f) Will the resultant outcome maximize social welfare and be Pareto-Efficient? 3