**NRU HSE-2020, Microeconomics Class-11**

# Game theory and Strategic interactions

**1.** There are two risk-neutral workers and two jobs. One job offers wage =10 and the other offers wage =6. Worker A first decides which job to apply to. Then worker B observes worker A’s choice and makes her decision. If there is one applicant for a job, she is employed and receives the associated wage. If both workers apply to same job, then the firm randomly chooses between the two applicants, and the other is unemployed at wage 0.

**(i)** Draw the extensive form of this game.

**(ii)** Identify actions and strategies for each player.

**(iii)** Write down the normal form for this game and find all pure strategy Nash-equilibria.

**(iv)** Now find the subgame perfect Nash equilibria. Explain carefully why some of the NE are not subgame perfect.

**2.** Consider the following extensive-form game with two players. Player 2 moves after player 1. Each player can produce a high output (H) or a low output (L). Player 1’s payoff is additionally influenced by an exogenous event which occurs with probability p∈[0, 1]. The payoffs are written as (Payoff to 1, Payoff to 2).

(2+p, 2)

**1**

L1

H1

**2**

H2

L2

(3-2p, 4)

(4-2p, 1)

**2**

H2

L2

(1+p, 1)

Suppose, before the start of the game, player 2 has the option of committing to produce a high output (H2). Making such a commitment requires player 2 to incur a cost of 1. Find the range of values of p for which it is optimal to make such a costly commitment.

**3.** In the town M each of the N > 2 inhabitants has $100. They are told that they can all voluntarily contribute to a fund that will be evenly divided among all residents. If $F is contributed to the fund, the local K-Mart will match the private contributions so that the total amount to be divided is $2F. That is, each resident will get back a payment of $2F/N when the fund is divided. If people in town care only about their own net incomes, and contributions are made independently, what is the Nash equilibrium?