INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
Algorithmic Game Theory 2020-21: Third Class Test

Answer all the questions.

1. (a) In a Bayesian game, we have 3 players, $|\Theta_1| = 7$, $|\Theta_2| = 5$, $|\Theta_3| = 6$, $|S_1| = 19$, $|S_2| = 20$, $|S_3| = 21$. What is the number of players and the number of strategies each player has in the corresponding Selten game? Justify your answer.

    [5 Marks]

    (b) Consider a three player extensive form game. Player 1 plays first, then player 2, and finally player 3 plays. Player 2 plays without observing the action played by player 1. Player 3 plays after observing the actions played by players 1 and 2. Players 1, 2, and 3 have 5, 7, and 11 strategies respectively. What is the number of players and what are the numbers of strategies available to each of them in the corresponding normal form game? Justify your answer.

    [5 Marks]

2. Let A be an $m \times n$ real matrix. Design an algorithm for computing the value in mixed strategies of the matrix game given by A within a multiplicative error of $(1 \pm \varepsilon)$ for some given $\varepsilon > 0$. Your algorithm should run in time polynomial in $\frac{1}{\varepsilon}$, m, and n. You can not use any algorithm for solving linear programs.
    Hint: What is the syllabus of this test?

    [10 Marks]