Theory of Games and Statistical Decision
M.Stat. 2nd Year(2020-21)
Assignment

Max. Marks: 60 [‡]

1. Answer the following questions: **(30)**
   (a) Consider a mixed extension of a matrix game A, where A is a 2×2 matrix. Write down the steps on how you will get the value of the game and an optimal strategy for each player. **(4)**
   (b) Give mathematical justification for your procedure. **(11)**
   (c) Consider the 2×2 matrix B given by:
   $$B = \begin{bmatrix} 17 & x+3 \\ x+2 & 20 \end{bmatrix}$$
   where x is the last digit of your recent class roll number. Solve for mixed extension of B, **(9)**
   (d) Discuss how a matrix game is settled at the value. That is , if the value exists and two intelligent players play the game, then it is nothing but transfer of value amount. **(6)**

2. Answer the following questions: **(30)**
   (a) What is mixed extension of a Bi-matrix game? How does it differ from a matrix game? **(3)**
   (b) Consider mixed extension of a Bi-matrix game (C,D), where C and D are 2×2 matrices. Write down the set of admissible strategies for each player.(without mathematical derivation.) **(9)**
   (c) A Bi-matrix game (C,D) is said to be almost antagonistic if,
   $$\begin{aligned} c_{ij} > c_{kl} \Leftrightarrow d_{ij} < d_{kl} \quad & \& \\ c_{ij} = c_{kl} \Leftrightarrow d_{ij} = d_{kl} \quad & \forall\ (i,j) \neq (k,l) \end{aligned}$$
   Let, $c_{11} > c_{12}$. Show that the 2×2 Bi-matrix game (C,D) is strategically equivalent to (P,Q) with

[‡] Please send your answer sheets in PDF format within 15 handwritten pages. Marks of the assignment to be ascertained by viva (to be scheduled by Dean's office.).

$$P = \begin{bmatrix} 1 & 0 \\ p_{21} & p_{22} \end{bmatrix}, \; Q = \begin{bmatrix} -k & 0 \\ q_{21} & q_{22} \end{bmatrix}$$

Where $p_{21}, p_{22}, q_{21}, q_{22} \in \mathbb{R}$ and $k > 0$. **(6)**

(d) From practical situations, give example of an almost antagonistic game. Give solution of the same and comment on it. **(12)**