BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION SP/2024)

CLASS: IMSc | **SEMESTER : VI**
BRANCH: CQEDS | **SESSION : SP/2024**

SUBJECT: ED319 GAME THEORY

TIME: 03 Hours | **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

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Q.1 The UPA and NDA parties are candidates fighting for the Lok sabha elections. The continuum of voters of India are placed in a straight line, in their favourite position. Establish in detail the Hotelling model of electoral competition and then solve Nash equilibrium of how the two candidates choose their winning policy (position on the straight line). [10] 1

Q.2 a. Consider the following centipede game and solve (with proper diagram) for the sub-game perfect Nash explaining what you did. [5+5] 2

Consider two players: Rachit and Sudhanshu. Each have 1$ in front of them at the beginning of the game. Rachit moves first. Each player alternatively has two moves available: either say "stop" or “continue”. If says continue then 1$ is taken from his pile and 2$ put in his opponent’s pile. The game ends if any one player says “stop” or when each player’s pile becomes 6$.

Q.3 Consider the following normal form game. [4] 3

		Player 2: C	Player 2: D
Player 1	C	6, 6	0, 8
	D	0, 2	4, 0

The stage game G

[6]

a. Assume that the above stage game is played 17 times. After each round, players observe the moves done by the other player. The total payoffs of the repeated game are the sum of the payoffs obtained in each round. Find all the subgame perfect Nash equilibrium of the repeated game.

b. Assume that the above stage game is played infinitely many times. The total payoffs of the repeated game are the discounted (with discount factor δ) sums of the payoffs obtained in each round. Is there a subgame perfect Nash equilibrium in pure strategies in which (C, C) is played in every round?

Q.4 Consider the following coalitional game: N = {1, 2, 3} and [5] 4
v({1}) = 10, v({2}) = 8, v({3}) = 6 v({1,2}) =24,
v({1,3}) = 22, v({2,3}) = 18 v({1,2,3}) = 34

a. Find the Shapley values for all players.
b. Is the Shapley pay-off vector member if the Core? [5]

Q.5 Set up an example of a first price sealed bid auction of your choice and justify your Nash bidding strategy if it is an auction of private value. [10] 5

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