BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION SP/2025)

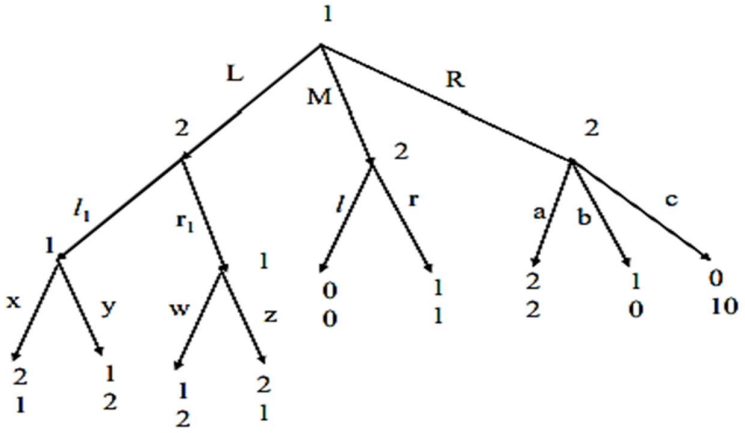
CLASS: IMSc — **SEMESTER : VI**
BRANCH: CQEDS — **SESSION : SP/2025**

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**

			CO	BL
Q.1	a. Solve for the Sub game Perfect Nash solutions explaining a method you will use. b. Solve the game in its normal form and find Nash solutions. Which of them qualify for SPNE?	[5+5]	1	2,3



Q.2	Suppose you and your roommate are jointly studying for GRE. Two people can perform the task if and only if, they both exert effort. They are both better off if they both exert effort and perform the task than if neither exerts effort (and nothing is accomplished); the worst outcome for each person is that she exerts effort and the other does not (in which case again nothing is accomplished). Let *c* be a positive number less than 1 that can be interpreted as the cost of exerting effort. a. Develop the normal form of the game with justifications from the information given. b. Find all the mixed strategy Nash equilibria of this game. How do the equilibria change as *c* increases?	[5+5]	2	4,5

Q.3

		Player 2	
		A	B
Player 1	A	$2, 2$	$-2, 6$
	B	$6, -2$	$0, 0$

The stage game G

Consider the following normal form game.

	a. Assume that the above stage game is played 12 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.	[4]	3	4,5
	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. For what values of the discount factor δ is there a subgame perfect Nash equilibrium in pure strategies in which (A, A) is played in every round?	[6]		

PTO

Q.4	Consider the following cooperative game: N = {1, 2, 3} and v({1}) = 2, v({2}) = 4, v({3}) = 1 v({1,2}) = 12, v({1,3}) = 10, v({2,3}) = 14, v({1,2,3}) = 16 a. Find the Shapley values for all players. [5] b. Are fair pay-offs also stable ones (member of the Core)? [5]		4	2,3
Q.5	Suppose you and your friend are putting up your tender quotations for selling gym equipments to a gym owner. The lowest bidder will get the tender. Arrange the problem in a structure you learnt, explain it and derive the Nash solution of bids.	[10]	5	3,4

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