

JK Lakshmipat University, Jaipur
Institute of Engineering and Technology
MTech.- A&R (3rd Sem.) and BTech 7th Sem. (Open Elective)
End Term Exam (Date: 6 Dec. 2022)

Course Code & Name: (EE 2202) Computational Game Theory and Applications

Time: 2 hr 30 hr.

Max. Marks: 60

Attempt all questions. All questions carry equal marks

Q1	Find the Shapley value of the game with characteristic function $v(\emptyset)=0$ $v(\{1\})=1$ $v(\{1, 2\})=2$ $v(\{2\})=0$ $v(\{1, 3\})=-1$ $v(\{1, 2, 3\})=6$ $v(\{3\})=-4$ $v(\{2, 3\})=3$	LO-1,2																																																						
Q2	You want to buy a used electric car tomorrow, so you went to your bank and withdrew \$8000 in cash. In the evening there is a football game that you want to attend, and you have the ticket, worth \$15. You read in the newspaper that during the last game, 5 out of 80000 spectators had their money stolen. You have lived in your apartment for 10 years and never had a burglary. What do you do? Stay at home and watch your money, or go to the game and leave the money at home, or go to the game and take the money with you? Explain.	LO-2																																																						
Q3	Analyze the following two-person zero-sum games for maximin moves, domination, best responses, and Nash equilibria: a) <table border="1"> <tr><td></td><td>L</td><td>R</td></tr> <tr><td>U</td><td>1</td><td>2</td></tr> <tr><td>D</td><td>3</td><td>4</td></tr> </table> b) <table border="1"> <tr><td></td><td>L</td><td>R</td></tr> <tr><td>U</td><td>1</td><td>2</td></tr> <tr><td>D</td><td>4</td><td>3</td></tr> </table> c) <table border="1"> <tr><td></td><td>L</td><td>R</td></tr> <tr><td>U</td><td>1</td><td>3</td></tr> <tr><td>D</td><td>2</td><td>4</td></tr> </table> d) <table border="1"> <tr><td></td><td>L</td><td>R</td></tr> <tr><td>U</td><td>1</td><td>3</td></tr> <tr><td>D</td><td>4</td><td>2</td></tr> </table> e) <table border="1"> <tr><td></td><td>L</td><td>R</td></tr> <tr><td>U</td><td>1</td><td>4</td></tr> <tr><td>D</td><td>2</td><td>3</td></tr> </table> f) <table border="1"> <tr><td></td><td>L</td><td>R</td></tr> <tr><td>U</td><td>1</td><td>4</td></tr> <tr><td>D</td><td>3</td><td>2</td></tr> </table>		L	R	U	1	2	D	3	4		L	R	U	1	2	D	4	3		L	R	U	1	3	D	2	4		L	R	U	1	3	D	4	2		L	R	U	1	4	D	2	3		L	R	U	1	4	D	3	2	LO-2
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Q4	Three players live in a town, and each can choose to contribute to fund a streetlamp. The value of having the streetlamp is 3 for each player, and the value of not having it is 0. The mayor asks each player to contribute either 1 or nothing. If at least two players contribute, then the lamp will be erected. If one player or no players contribute then the lamp will not be erected, in which case any person who contributed will not get his money back. a. Write out or graph each player's best-response correspondence. b. What outcomes can be supported as pure-strategy Nash equilibria?	LO-3																																																						
Q5	Consider two competing firms in a declining industry that cannot support both firms profitably. Each firm has three possible choices, as it must decide whether or not to exit the industry immediately, at the end of this quarter, or at the end of the next quarter. If a firm chooses to exit then its payoff is 0 from that point onward. Each quarter that both firms operate yields each a loss equal to -1, and each quarter that a firm operates alone yields it a payoff of 2. For example, if firm 1 plans to exit at the end of this quarter while firm 2 plans to exit at the end of the next quarter then the payoffs are (-1, 1) because both firms lose -1 in the first quarter and firm 2 gains 2 in the second. The payoff for each firm is the sum of its quarterly payoffs. a. Write down this game in matrix form. b. Are there any strictly dominated strategies? Are there any weakly dominated strategies? c. Find the pure-strategy Nash equilibria. d. Find the unique mixed-strategy Nash equilibrium.	LO-4																																																						
Q6	Develop the strategy based on non-cooperative game theory for Electric Vehicle Charging Stations. The electricity for charging stations with limited power availability can be supplied from utility grid, Solar PV systems and energy storage devices etc. The charging station offers all possible options including slow, medium and fast charging options.	LO-5																																																						