

Minor_1 (Advanced AI)

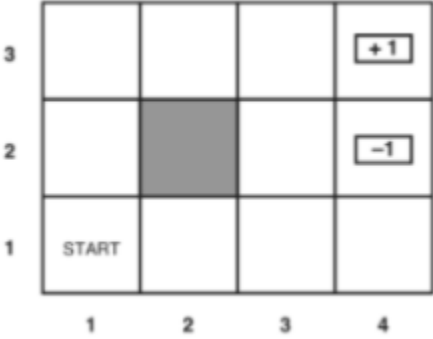
Date: Sep 4, 2022 ; Full Points: 50; Time: 1 hour

Instructions:

- You have exactly 1 hour (11:30 - 12:30pm) to write and you must submit scanned copies of your work within 10 minutes of the end of the exam
- Please upload a single pdf file as your submission
- Detailed answers are to be given for only subjective questions
- In case of any doubts, make suitable assumptions and include that in your responses.

Section 1: MCQ

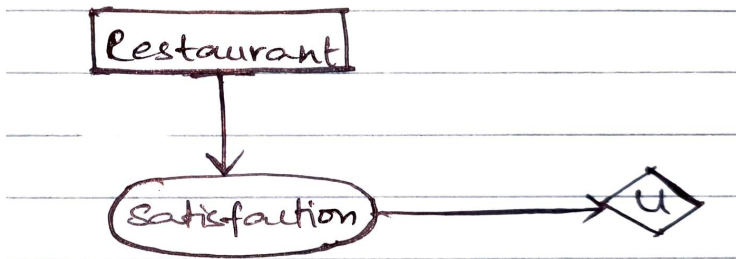
No.	Question	Points
1	A set of attributes is termed as MUI (Mutually Utility Independent) when? a) Attribute for utility is not considered b) Each attribute of utility is dependent of remain set. c) Each attribute of utility is independent of remain set. d) b and c both	1
2	Consider the following statements about POMDPs. Which of the following is/are correct. a) POMDPs can be used when there are many states giving the same observation b) A probability distribution over belief states in a POMDP is a substitute for maintaining a complete history of actions taken and observations made c) Actions' effects on states in POMDPs are the same as in MDPs d) The set of observations in a POMDP does not have a 1-to-1 match to that POMDP's set of states.	2
3	The size of the payoff matrix of a game can be reduced by using the principle of a) game inversion b) rotation reduction c) Dominance d) game transpose	1

4	<p>In this diag., every block would reward -0.04 except +1 and -1 if agent reaches the +1 state after 12 steps, the utility will be.</p>  <p>a) 0.6 b) 0.52 c) 0.48 d) None of the above</p>	2
5	<p>Statement 1: No saddle point (a potential rational outcome) exists in a mixed strategy game Statement 2: In a pure strategy each player selects strategy arbitrarily</p> <p>a) Statement 1 is true, Statement 2 is false b) Statement 1 is true, Statement 2 is true c) Statement 1 is false, Statement 2 is false d) Statement 1 is false, Statement 2 is true</p>	1
6	<p>Statement 1: Risk-averse individuals have concave (to the origin) indifference curves. Statement 2: Risk-inclined individuals have convex indifference curves</p> <p>a) Statement 1 is true, Statement 2 is false b) Statement 1 is true, Statement 2 is true c) Statement 1 is false, Statement 2 is false d) Statement 1 is false, Statement 2 is true</p>	2
7	<p>Choose the correct answer:</p> <p>(a) Nash equilibrium is when agent knows it's opponent's dominant strategy (b) Dominant strategy is with a prior knowledge of the about opponent's optimal strategy (c) Agents do not have knowledge about their opponent's optimal strategies at Nash equilibrium (d) Dominant strategy is without a prior knowledge of the about opponent's optimal strategy</p>	2

8	<p>Discounted rewards are useful when the agent knows how many stages will lead it to a goal state, while the when the agent lacks the information about the number of steps that will lead it to a goal state, it uses additive rewards.</p> <p>(a) True (b) False</p>	2									
9	<p>Choose the correct option(s): Situation: Acme and Best, a video game console manufacturer and a video game software producer need to decide upon the production of their next game between bluray or dvd. Condition: if both use the same disc type, then the reward is more and hence both will be better profited.</p> <table border="1"> <tr> <td></td><td><i>Acme:bluray</i></td><td><i>Acme:dvd</i></td></tr> <tr> <td><i>Best:bluray</i></td><td>$A = +9, B = +9$</td><td>$A = -4, B = -1$</td></tr> <tr> <td><i>Best:dvd</i></td><td>$A = -3, B = -1$</td><td>$A = +5, B = +5$</td></tr> </table> <p>(a) $(A = +9, B = +9)$ is a Nash Equilibrium but is not Pareto Optimal (b) $(A = +5, B = +5)$ is Pareto Optimal but it is not a Nash Equilibrium (c) $(A = +9, B = +9)$ and $(A = +5, B = +5)$ are both Pareto Optimal solutions (d) Above game has 2 Nash Equilibria</p>		<i>Acme:bluray</i>	<i>Acme:dvd</i>	<i>Best:bluray</i>	$A = +9, B = +9$	$A = -4, B = -1$	<i>Best:dvd</i>	$A = -3, B = -1$	$A = +5, B = +5$	2
	<i>Acme:bluray</i>	<i>Acme:dvd</i>									
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Section 2: Short answer questions

No.	Question	Points
1	<p>It's the weekend, and you plan to go out. You find your favourite standup comedian is having a show at the Mall. You also find out that one of your favourite bands is in town and is having a show at Open grounds. However, you do not know when the show starts.</p> <p>You have two choices - either buy both the tickets at a reduced price, or you can choose to buy the concert ticket after the standup event is over to prevent wasting money in case of a clash.</p> <p>The probability of finding the time of both events is 0.3. The price of tickets is 300 when buying both together while buying separately will cost you 200 each. The value of attending a standup special is 200.</p> <p>Explain mathematically what you should choose. Draw the decision network and decision tree for the same.</p>	10

2	<p>In the TV series, The Big Bang Theory, Sheldon deems that the game of rock, paper, scissors is not fair if the opponents know each other. So he comes up with his own version, Rock, papers, scissors, lizards, Spock. Here Scissors cuts paper, paper covers rock, rock crushes lizard, lizard poisons Spock, Spock smashes scissors, scissors decapitates lizard, lizard eats paper, paper disproves Spock, Spock vaporises rock, and as it always has, rock crushes scissors.</p> <p>Draw the payoff matrix for this game and find a mixed strategy for the game. Which item gives the player more chances of winning?</p>	5
3	<p>(a) Define Mutual Preferential Independence. Give a real life example for the same.</p> <p>(b) What is a Dominant Strategy when more than one agent is involved in a game. How are dominant strategies taken by agents and Nash Equilibrium related. Support your later argument with an example.</p>	10
4	<p>You are given a decision problem where you have to decide whether to place an order for your meals from a restaurant or not. The decision network for the same is as given below.</p> <p>Formulate and solve the decision problem. The decision network shows the utility node as a function of two variables - your decision(true/false) as well as whether you will be satisfied or not(true/false). Assume some convenient form of the utility function.</p> <p>For a given restaurant, show the steps that you would follow to come up with an informed decision.</p> 	10