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| Q | CO | Lvl | **QUESTIONS** | Marks |
| 1A | 1 | 2 | Briefly write about Artificial Intelligence and difference branches of AI? | 6 |
| 1B | 1 | 2 | Write briefly about the following with examples and algorithm   1. Describe-And-Match method 2. Generate and Test Method 3. Means-End Analysis Method | 9 |
| 2A | 2 | 3 | A newspaper journalist wants to prove that Tony Stark is Iron Man, starting from the following rules:  P0 IF '(?a) sells weapons'  THEN '(?a) is a genius'  P1 IF AND('(?a) is a genius',  OR('(?a) is captured',  '(?a) is evil'))  THEN '(?a) builds a suit'  P2 IF '(?a) plots against (?b)'  THEN ('(?a) is evil',  '(?b) is captured')  P3 IF AND('(?a) sells weapons',  '(?b) is evil')  THEN ('(?a) catches (?b) selling illegal weapons',  '(?a) stops selling weapons')  P4 IF AND('(?a) builds a suit',  '(?a) catches (?b) selling illegal weapons')  THEN '(?a) is Iron Man'  The journalist starts with four **assertions for backward chaining:**  A0: 'Stark is a genius'  A1: 'Stark sells weapons'  A2: 'Stark is captured'  A3: 'Obadiah is evil'  Using these assertions, perform backward chaining starting from the  hypothesis:  **'Stark is Iron Man'**  **Use the backward chaining and find whether the hypothesis is correct or not. Show the tree trace.**  **Another journalist use the following assertions with same set of rules:**  A0: 'Obadiah is a genius'  A1: 'Stark sells weapons'  A2: 'Obadiah plots against Stark'  A3: 'Stark is a genius'  Make the following assumptions about forward chaining:  • When multiple rules match, rule-ordering determines which rule fires.  • New assertions are added to the bottom of the list of assertions.  • If a particular rule matches in multiple ways, the matches are  considered in top-to-bottom order of the matched assertions. (For  example, if a particular rule has a match with A1, and another match  with A2, the match with A1 is considered first.)  Prepare your table with new assertion added at the end of the Assertion List and find whether **'Stark is Iron Man'** | 5  10 |
|  |  |  | OR |  |
| 2B |  |  | Illustrate the working of the following searches:   1. Depth First Search 2. Breadth First Search 3. Best First Search 4. A\* Algorithm 5. Branch and Bound | 10 |
| 2C |  |  | Based on Fig 2C given below: Using Branch and Bound, find the path traversed. | 5 |
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| 3A |  |  | Minnie Mouse is celebrating her birthday by playing a board game with  Mickey. Minnie uses a strategy she calls minnie-max (minimax). Minnie  wants to minimize the score, while Mickey wants to maximize it. Because it  is her birthday, **Minnie (MIN) plays first**.  The game tree below shows the static values (heuristic scores) three moves  ahead.    **Complete the game tree above using minimax** with NO pruning:  1. Write the minimax score in each node. | 7 |
| 3B |  |  | Three students (**R**on, **H**ermione, **M**alfoy) are looking for train compartments to sit in on the Hogwarts Express train. There are four compartments (1, 2, 3, 4), and each compartment can hold any number of students.  The students have following constraints:  1. **M**alfoy despises **R**on and **H**ermione, so **M**alfoy must not sit in the same compartment as either of them.  2. **H**ermione wants to keep an eye on **M**alfoy, so their compartments must be adjacent (and not the same).  3. **R**on has a crush on **H**ermione, but he also thinks she's an obnoxious know-it-all, so their compartments must be adjacent (and not the same).  Alas, **a dementor has just arrived in compartment 3**, so no one should sit there. Thus, the initial domains are:   |  |  | | --- | --- | | R | 1 2 4 | | M | 1 2 4 | | H | 1 2 4 |   Write the proper adjacent graph based on the rules, using DFS and forward-checking and NO Propagation assign students in the order of Ron – Malfoy – Hermione. | 8 |
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| 4A |  |  | What is Rote Learning and how can you use such learning in AI? | 4 |
|  |  |  | Briefly write about decision tree algorithm for Candidate Elimination | 6 |
|  |  |  | Illustrate Process of learning in AI | 5 |
|  |  |  |  |  |
| 5 |  |  | Define learning? | 4 |
|  |  |  | Illustrate difference between Neural Networks and Genetic Algorithm | 6 |
|  |  |  | How does CNN work? | 5 |
|  |  |  |  |  |
| 6 |  |  | You want to use support vector machines (SVM) to help detect steganography. That is, you want to classify digital images based on whether they have been altered to hide a message inside the bits. Based on several features of each image, you train a linear classifier on regular images and altered images. The altered images are marked below with '+' and the regular images are marked with '-':  Draw the decision boundary found by the linear SVM. Three vectors lie in the gutters defined by your decision boundary. Two of them are support vectors and one is not (that is, one has an alpha of zero). Circle the support vectors.  What is value of vector w and b ( h(x) = wx +b)  Solve the supportiveness values | 15 |

Fig 2c