# AI & ML

unit -1

1. What is Artificial Intelligence? Explain in brief it's Importance.
2. Compare Strong AI & weak AI methods.
3. Demonstrate the semantic net with an example.
4. a) For a problem of Missionaries and Cannibals in AI write - the operators and draw the search tree without cycles having solution for the same.
5. Write a note on Combinatorial Explosion and problem reduction
6. Explain Turing test & chinese room arguement experiment. Compare and contrast.

3a) eg:- Tom is a cat. Tom caught a bird. Tom is owened by John. Tom - is ginger in color. Cat like cream. The cat sat on mat. A cat - is a mammal. A bird is an animal. All mammals are - animals. Mammals have fur.

4b) A farmer is an one side of river and wishes to cross the river with a wolf, a chicken, and a bag of grain. He can take only - one item at a time in his boat with them. He can't leave - the chicken alone with the grain, or it will eat the grain, & - he can't leave the wolf alone with chicken, or wolf will - eat the chicken. How does he get all three safely accross to - the other side?

7. Explain the relationship between graphs, semantic nets, semantic- trees, search spaces, and search trees.

unit -2

1. Explain how searching helps in problem solving emphasizing - on types of searches in AI.
2. Demonstrate the working of DFS & BFS algorithms by the - use of either algorithm or pseudo-code for the same.
3. List and explain properties of search methods.
4. Explain with fig. the three problems that could be faced by - HILL climbing algorithmic techniques. And also pseudo code for Hill - climbing

10. Explain ant colony optimization with an example.

2a) Compare both search techniques with an example code.

5. Explain with example how you use heuristics for search. Explain the criteria for selecting a good heuristic.

6. Explain different techniques to identify optimal paths.

7. Explain local search & metaheuristic technique

8. Apply BFS for following tree, show its tracing and find the sol. Start node: A, Goal node: F
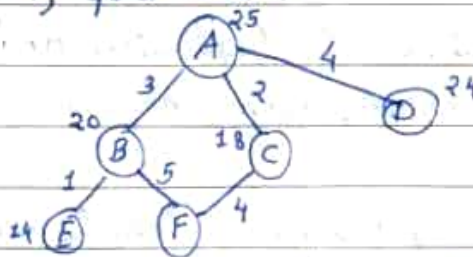
8a) Apply DFID algo. and solve for the same fig. (above) to find the sol. for the tree given above. Show output for each level. compute the total no. of node to be examined.

9. Implement a greedy-search algorithm. How well does it perform compared with the other methods you have implemented. Invent 0-1 knapsack problem, and use search tree implementation to model this problem. Can you model the fractional knapsack problem using a search tree.

9a) Solve the given data (below) of fractional knapsack problem using profit by weight approach.

objects	1	2	3	4	5	6	7
profit	5	10	15	7	8	9	4
weight	1	3	5	4	1	3	2

Total given weight is 15kg and n = 7.

unit-3

1. Demonstrate the use of game trees in solving tic-tac-toe problem. Draw partial game tree for the same.

2. Write a note on Alpha-beta pruning emphasizing on its effectiveness and its implementation.

3. State the deduction theorem & apply the same to prove following

$\{A \rightarrow B\} \vdash A \rightarrow (C \rightarrow B)$

4. Write a note on Soundness, Completeness, Decidability, Monoto-nicity.

5. Explain the following terms (i) Game Trees (ii) Minimax (iii) Alpha-beta pruning.

6. What is Logic? Explain why logic is used in Artificial-Intelligence and explain Logical operators.

7. Explain the concepts of Translating bet^n English & Logic-Notation and explain the following Truth tables of NOT, AND, OR, Implies, if, complex Truth tables.

unit-4

1. What is need of training in Machine Learning? Using a simple-learning method Derive a final hypothesis which is consistent-for following training data:

   ⟨slow, wind, 30ft, 0, evening, cold⟩
   ⟨slow, rain, 20ft, 0, evening, warm⟩
   ⟨slow, snow, 30ft, 0, afternoon, cold⟩

2. Explain the candidate elimination technique & Meaning of Inductive-bias.

3. Explain in brief the three types of learning methodologies. In-Artificial Neural Networks.

4. Demonstrate the working of simple perceptron to represent the-learning of logical OR function for maximum 3 epochs.

4a) Apply perceptron training process to calculate the binary AND, OR & NOT functions on two points.

5. Theory for Bidirectional Associative Memory (BAM) & associated-problems.

6. Hop field Theory & Associated problems.

7. ID3 & Decision tree and problems.

8. What are goal trees Explain & why are they useful to AI.

9. Draw goal trees to represent the following:

i) A map colarity problem with six countries & four colors.

ii) Tower of Hanoi problem with four disks.

10. Explain Constraint Satisfaction search with an example.

11. Explain Multilayer neural network with an example diag. and also write why backpropogation is required.

7a. 12. Draw a decision tree for determining whether or not a film will be a box office success.

1a. Find S algorithm for the below given training data to find the final hypothesis.

Example	Citations	Size	InLibrary	Price	Editions	Buy
1	Same	Small	No	Affordable	Many	no
2	many	big	No	Expensive	one	yes
3	same	big	always	Expensive	few	no
4	many	Medium	No	Expensive	many	yes
5	many	Small	No	Affordable	many	yes

unit-5

1. Explain with an example the working of probablistic Reasoning and Joint probability Distribution.

2. Explain how learning happens in Simple Bayesian Concept Learning?

3. Write a Note on Bayesian Belief Networks and the Noisy-V - Function.