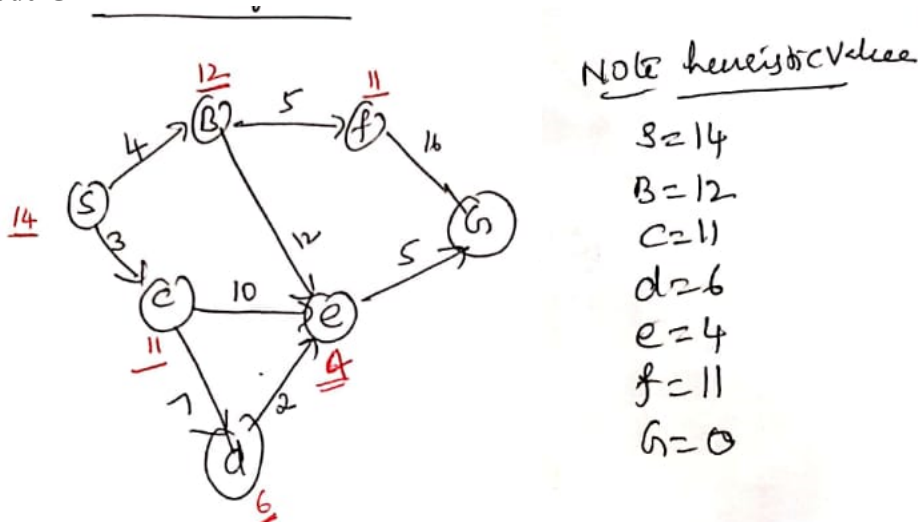
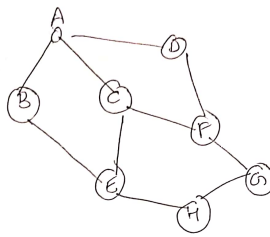


**Module-1**

1. 1. Define Artificial intelligence. Explain the interaction between agent and its environment with an example.
2. Define Artificial Intelligence. Explain different views of AI
3. Define Agent program. Briefly explain the different types of agents with a neat diagram.
4. Explain BFS and DFS uninformed search strategies. Give the properties of DFS and BFS
5. Illustrate A\* algorithm. Apply the algorithm to find the cheapest path to the Goal node G



6. Explain different properties of task environment.
7. What is meant by uninformed search? Explain BFS.
8. Compare DFS and BFS search algorithm with an example.
9. Explain heuristic search function with an example.
10. Differentiate between uninformed and informed search.
11. Explain the concept of rationality.
12. With an example explain uniform-cost search algorithm.
13. With an example explain Depth-limited search and Iterative deepening search.
14. Illustrate Greedy Best-first Search informed search strategy. Apply the algorithm to find the cheapest path to the Goal node G



Heuristic Value  
Straight line distance

$A \rightarrow G = 40$   
 $B \rightarrow G = 32$   
 $C \rightarrow G = 25$   
 $D \rightarrow G = 35$   
 $E \rightarrow G = 19$   
 $F \rightarrow G = 17$   
 $H \rightarrow G = 10$   
 $G \rightarrow G = 0$

15. Illustrate how 8 puzzle problem is solved using heuristic functions

## Module-2

1. Explain min-max algorithm with an example.
2. What is the disadvantage of Mini-max algorithm? Apply Alpha-Beta Pruning and solve with an example
3. Explain wumpus world problem. Describe its PEAS description.
4. Define knowledge based agents. Explain with an algorithm.
5. Describe the propositional resolution algorithm.
6. Summarize the syntax and semantics for propositional logic. Write BNF grammar of sentences in propositional logic.
7. Explain forward chaining algorithm for propositional logic.
8. With an algorithm and example explain alpha-beta pruning
9. Briefly explain CNF with an example.
10. Convert the following into propositional logic

My heart beats iff I am alive

If it is humid, then it is raining.

It is noon and Ram is sleeping.

Apple and orange are fruits

If it is a month of may then it will not rain.

11. Consider the following Knowledge Base:

1. The humidity is high or the sky is cloudy.
  2. If the sky is cloudy, then it will rain.
  3. If the humidity is high, then it is hot.
  4. It is not hot.
- Goal: It will rain.

12. Use propositional logic and apply resolution method to prove that the goal is derivable from the given knowledge base

13. Consider the following Knowledge Base:

1. If maid stole the jewellery, then butler is not guilty.
2. Either maid stole the jewellery, or she milk the cow.
3. If maid milk the cow then butler got the cream.

Goal is: Therefore if butler is guilty then he got the cream.

Use propositional logic and apply resolution method to prove that the goal is derivable from the given knowledge base

14. Explain the steps followed to convert the propositional logic into resolution method and steps used to convert into CNF.

### Module 3:

1. Explain different types of quantifiers in first order logic
2. Convert the following into first order logic  
If x is a man then x is mortal.  
Some boys play cricket  
Not all students like both Mathematics and Science  
Some cows are black and some cows are white.  
All dogs have four legs  
Every man respects his parent.
3. What is unification and explain with an example unification algorithm.
4. Explain the basic inference rules in first order logic
5. Explain the syntax and semantics for first order logic.
6. Define Quantifiers. Differentiate between universal quantification and existential quantification.
7. Explain each of the following with an example  
(a) Terms (b) Atomic sentences (c) Complex sentences
8. Briefly explain the steps involved in knowledge engineering process.

### Module 4:

1. Define Ontological engineering. Write a note on characteristics of ontologies.
2. Define Event calculus. Write a note on processes and time intervals.
3. Briefly discuss the categories and objects in knowledge representation.
4. Explain semantic network with an example in knowledge representation.
5. Explain Description Logics with an example in knowledge representation.
6. Explain Circumscription and default logic.
7. Explain the truth maintenance systems.
8. Describe reasoning with default information with an example.

9. Consider Internet shopping world and explain its representation in AI

## Module 5

1. Explain the process of planning graph for heuristic estimation. Write Graph Plan algorithm.
2. Explain the different mutex relations in planning graph.
3. Explain planning in blocks-world problem, Air cargo transport, The spare tire problem.
4. Specify the two algorithms for planning as state-space search. Explain Each.
5. Explain the planning graph for Dinner Date example,  
Initial = {garbage, ClearHands, quiet}  
goal = {dinner, present, ~garbage}

Actions	Preconditions	Effect
Cook()	ClearHands	dinner
Wrap()	quiet	present
Carry()	none	~garbage, ~ClearHands
Dolly()	none	~garbage, ~quiet.

6. Briefly explain the concept of uncertainty.
7. Describe inference using full joint distributions.
8. Explain independence with an example.
9. Determine Baye's rule and its use.
10. Define Bayesian network. Explain how it is used to represent knowledge.
11. Explain planning in blocks-world problem, Air cargo transport, The spare tire problem.
12. Specify the two algorithms for planning as state-space search. Explain Each.
13. Briefly explain the concept of uncertainty.
14. Describe inference using full joint distributions.
15. Explain independence with an example.
16. Determine Baye's rule and its use.
17. For example, a doctor knows that the disease meningitis causes the patient to have a stiff neck, say, 70% of the time. The doctor also knows some unconditional facts: the prior probability that a patient has meningitis is 1/50,000, and the prior probability that any patient has a stiff neck is 1%. Letting  $s$  be the proposition that the patient has a stiff neck and  $m$  be the proposition that the patient has meningitis, we have
18. Patient has liver disease." Past data tells you that 10% of patients entering your clinic have liver disease. Patient is an alcoholic." Five percent of the clinic's patients are alcoholics. You might also know that among those patients diagnosed with liver

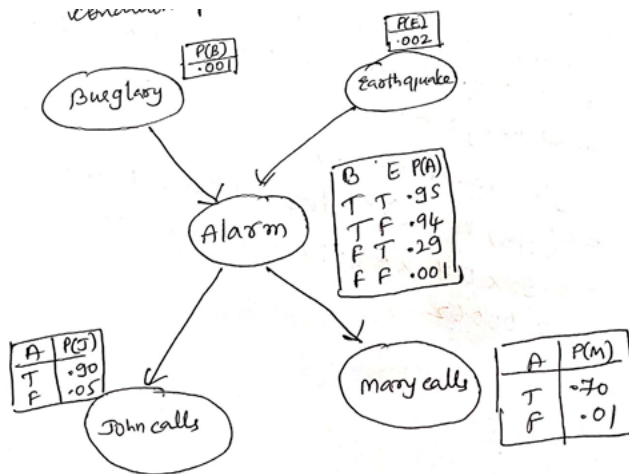
disease, 7% are alcoholics. What is the chances of having a liver disease if the patient is alcoholic?

19. Example:

- dangerous fires are rare (1%)
- but smoke is fairly common (10%) due to barbecues,
- and 90% of dangerous fires make smoke.

What is the probability of dangerous fire when there is a smoke.

20.



Explain Semantics of Bayesian Belief Network with an example of Burglar Alarm? Calculate the probability that alarm has sounded, but neither Burglary nor Earthquake has occurred and both John and Mary calls and also find the probability that John calls.

21. Explain different types of inferences in Bayesian Belief Network with an example.

22. Find the probability of Late for the class both by Inference by Enumeration and Variable Elimination for the following data.

Random Variables

- R : Raining
- T : Traffic
- L : Late for class



$P(L) = ?$

$$= \sum_{R, T} P(R, T, L)$$

$$= \sum_{R, T} P(R) P(T|R) P(L|T)$$

$P(R)$

R	P(R)
+R	0.1
-R	0.9

$P(T|R)$

R	T	P(T R)
+R	+T	0.8
+R	-T	0.2
-R	+T	0.1
-R	-T	0.9

$P(L|T)$

T	L	P(L T)
+T	+L	0.3
+T	-L	0.7
-T	+L	0.1
-T	-L	0.9

