Exam Date & Time: 28-Apr-2023 (01:15 PM - 04:30 PM)

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

University Examination April 2023
B.Tech.(CE)-VI
Time:- 01:15 pm to 04:30 pm

ARTIFICIAL INTELLIGENCE [CE357]

Marks: 70 **Duration: 195 mins.**

Section-I

Answer all the questions. Section Duration: 40 mins

1 Which of the following shape is not type of the membershipfunctions? (1)

1) Gaussian 2) Circle 3) trapezoidal 4) triangular

2 Which of the followings are text preprocessing steps? (1)

1) Tokenization 2) Applying Machine Learning Algorithms 3) Identifying emotions from a given text 4) Removing Stop words

3 What will be the output of the following prolog program if thegiven input goal query is a(X)? (2)

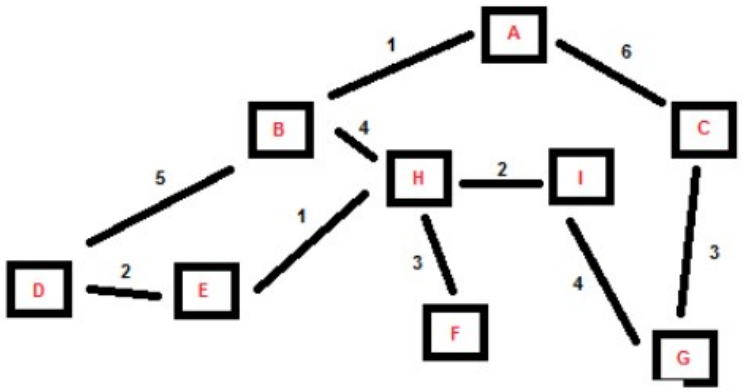
```
a(0).
a(X):-!,b(X).
b(1).
b(2).
b(X):-c(X),!.
b(3).
c(4).
c(5).
c(X):-!,d(X).
c(6).
d(7).
```

1) X=0, X=2, X=3, X=4 2) X=0, X=1, X=3, X=4 3) X=1, X=1, X=2, X=4 4) X=0, X=1, X=2, X=4

4 To which depth does the alpha-beta pruning can be applied? (1)

1) 10 States 2) 8 States 3) 6 States 4) Any States

5 Find the path from Node D to Node G using Best First SearchAlgorithm. (1)



1) D-E-H-I-G 2) D-B-H-I-G 3) D-B-A-C-G 4) All of the above

6 The search in game-playing programs always proceed _____ from thecurrent position rather than _____ from a goal state. (1)

1) forward, backward 2) backward, forward 3) forward, forward 4) backward, backward

7 _____ is a mapping process from a space of fuzzy controlactions defined over an output universe of discourse into a spaceof crisp control actions. (1)

1) Fuzzification 2) Membership Function 3) Defuzzification 4) Activation Function

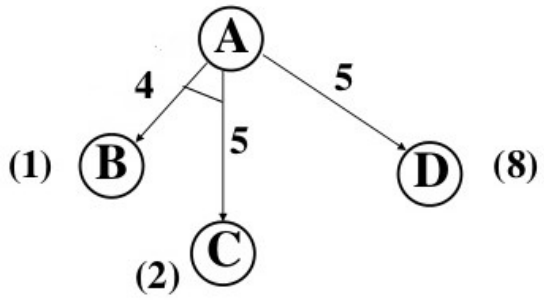
8 Input applied in ANN passed on to layers hidden to produce outcomeis referred to as _____. (1)

1) Signal Propagation 2) Forward Propagation 3) Backward Propagation 4) Channel Propagation

9 Which statement is valid for the Heuristic function? (1)

1) The heuristic function is used to solve mathematical problems.
2) The heuristic function takes parameters of type string and returns an integer value.
3) The heuristic function calculates the cost of an optimal path between the pair of states.
4) The heuristic function does not have any return type.

10 Consider the following AO graph: Which is the best node to expandnext by AO* algorithm if CURRENT NODE is A? Consider the Edge costgiven in the figure and perform calculations accordingly. Thevalues with brackets "()" are heuristic values. (1)



1) B 2) C 3) D 4) All of the above

11 What will be the output of the following prolog program if thegiven input query is do. ? (2)

```
do:-p(N),q(N), write(N),!, r(N).
p(1).
p(2).
p(3).
p(4).
q(2).
q(3).
q(4).
r(3).
```

1) 2 no. 2) 2 yes. 3) 2 3 4 no. 4) 2 3 4 yes.

12 What will be the output of the variable X for the following prologprogram if given query is funct(5,X)? (1)

```
funct(0,1).
funct(N, F) :- N > 0, N1 is N - 1,funct( N1, F1), F is N*F1.
```

1) 0 2) 24 3) 120 4) 15

13 What will be the output of the following prolog program if giveninput query is solve(X)? (2)

```
s(c).
s(m).
s(d).

solve(X) :- s(X), !.
solve(other_solution).
```

1) c 2) d 3) c, m ,d 4) c, d

14 What will the output of the following prolog program if the giveninput goal query is c(X)? (2)

```
a(0).
a(X):- !,b(X).
```

```
b(1).
b(2).
b(X):-c(X),!.
b(3).
c(4).
c(5).
c(X):-!,d(X).
c(6).
d(7).
```

1) X=5, X=4, X=7 2) X=4, X=5, X=7 3) X=4, X=7, X=7 4) X=4, X=5, X=5

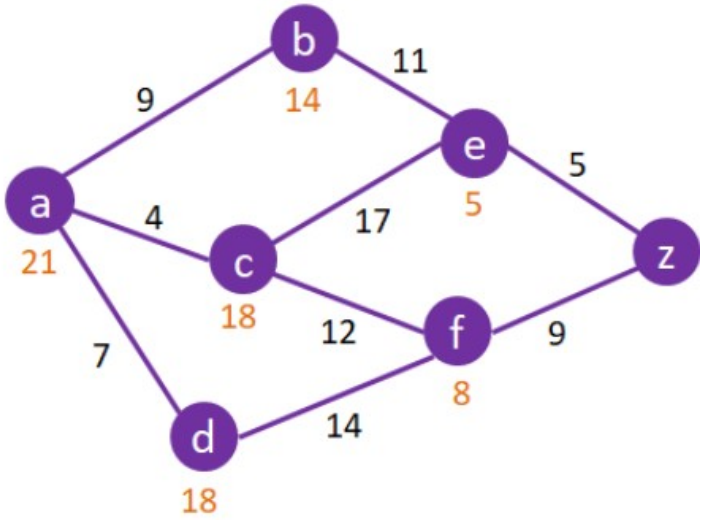
15 What is the logical translation of the following statement?
"None of my friends are perfect." (2)

1) $\exists x(F(x)\wedge\neg P(x))$ 2) $\exists x(\neg F(x)\wedge P(x))$ 3) $\exists x(\neg F(x)\wedge\neg P(x))$ 4) $\neg\exists x(F(x)\wedge P(x))$

Section-II

Answer 5 out of 6 questions.

1 Solve the following problem using A* Algorithm. Consider a as thestarting node and z as the Goal State to reach. Numbers in orange are the Heuristic Values. (5)



2 Create an illustration of the ANN's fundamental structure. Where isthe knowledge in ANN kept? List the different ANN applications.What distinguishes Convolution Neural Networks (CNN) from ANNs? (5)

3 Consider the following sentences:

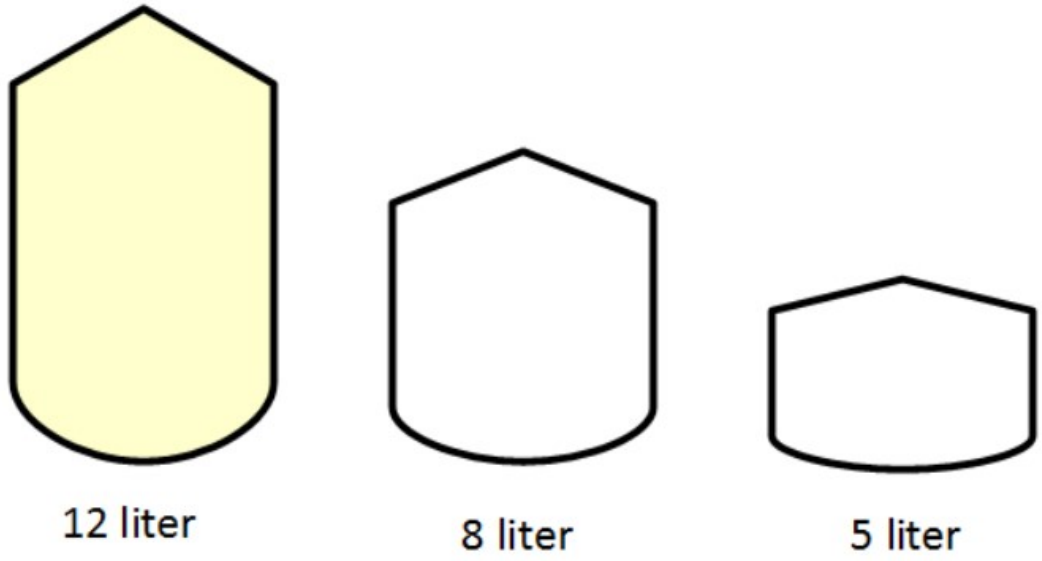
1. Liquid CO_2, H_2SO_4, DDT,Caffeine and Ethylene Glycol are hazardous for health.
2. If x contains something that is hazardous for health, then x isalso hazardous.
3. Coke contains all the items in fact - 1. above.

(5)

Prove by resolution that: "Drinking Coke is NOT good for health".

4 How do problem characteristics help in the selection of techniques?Solve the problem mentioned below:

(5)



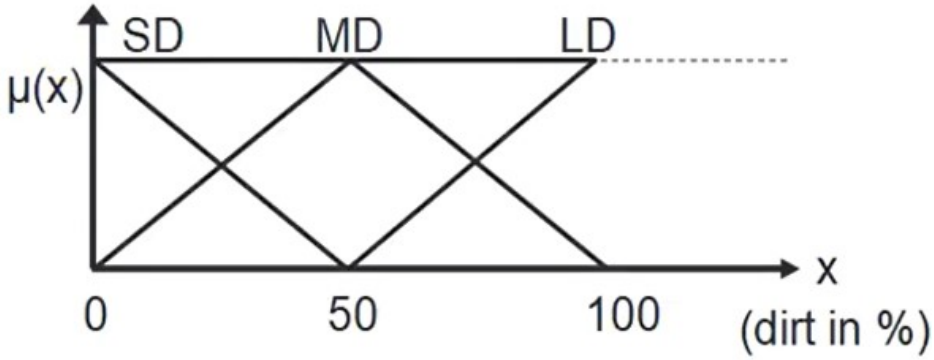
A milkman carries a full 12 litre container of milk. He needs todeliver exactly 6 litres. But the customer only has 8 and 5 litrejugs. Neither jug has any measuring markings on it. Analyze theabove problem with respect to the seven problem characteristics.

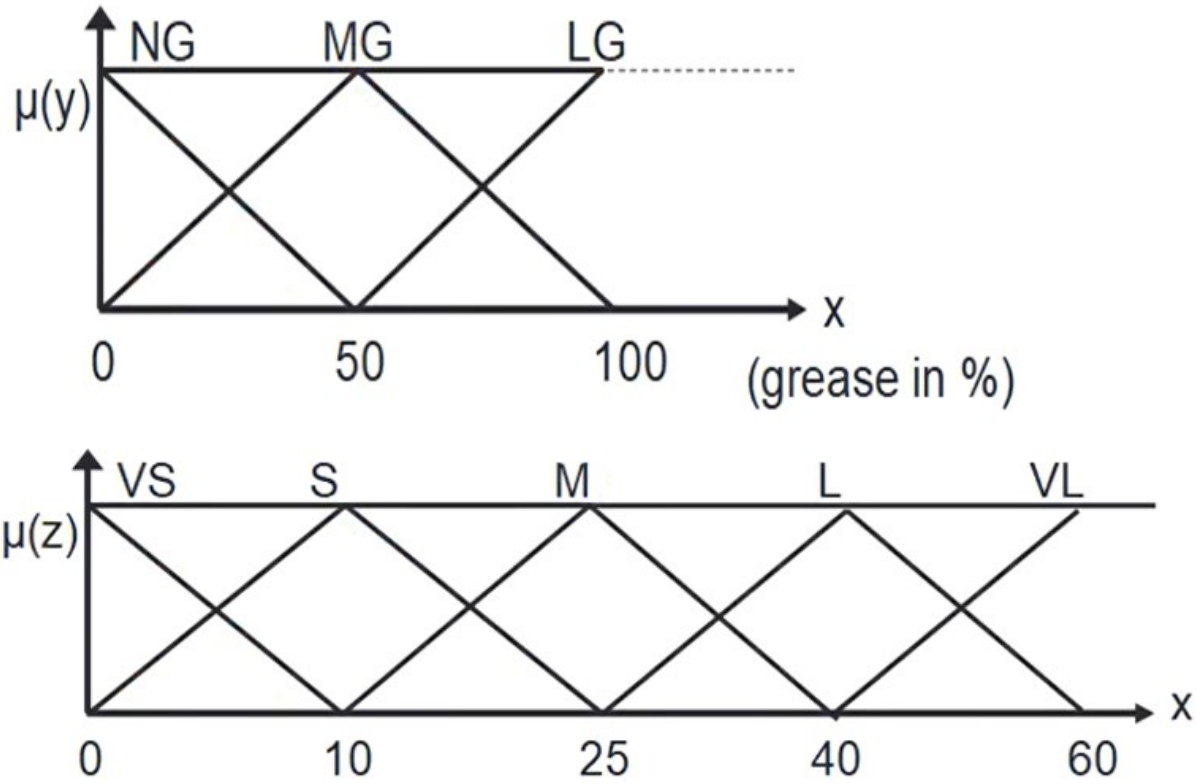
5			How the frames are organized? What are the major advantages anddisadvantages of frames and semantic nets? Why the scripts arerequired? Can it be considered as a variant of frames?	(5)
6			Justify that "In fuzzy logic, the truth of any statement becomes amatter of degree". Compare Fuzzy Logic with Binary Logic. Givereal-world applications of the Fuzzy Logic.	(5)

Section-III

Answer 5 out of 6 questions.

1			What are the basic characteristics of the Expert System? Describethe main applications of Expert Systems. What are the difficultiesin developing an Expert System?	(5)
2			Explain the major phases involved in NLP. Describe the role of eachphase in detail with an example.	(5)
3			Design a controller to determine wash time of a domestic washingmachine. Assume the input is dirt and grease on cloths. Use threedescriptors for input variables and five descriptors for outputvariables. Derive the set of rules for controller action anddefuzzification. The design should be supported by the figurewherever possible. Use triangular member function (as shown in theFigure below) for each output and input variables. Wash time is inminute. What will be the value of wash time if the given Dirt valueis 60% and Grease value is 70% when mean of max defuzzificationtechnique is applied? Show that if the cloths are solid to a largerdegree the wash time will be more and vice versa.	(5)

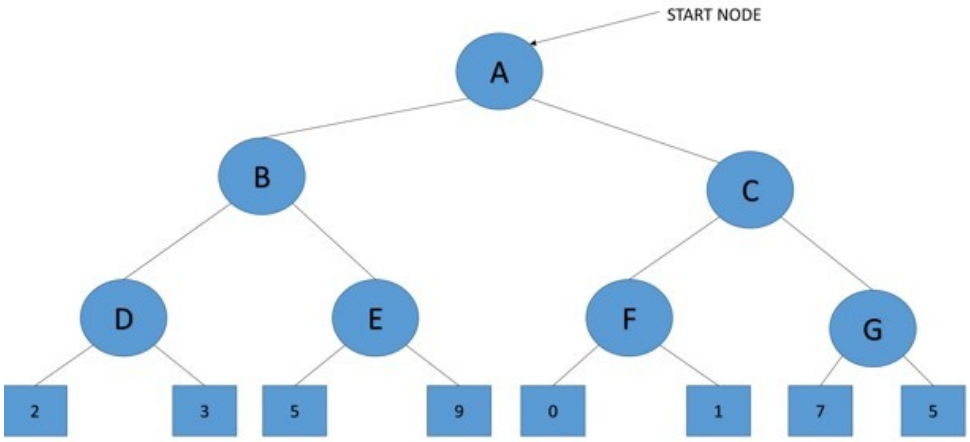




4 How does supervised learning is different from unsupervisedlearning? What is a Confusion Matrix? Describe its role in your ownwords. What do you understand by Type I and Type II errors?Calculate Accuracy, Misclassification Rate, Sensitivity andPrecision for the following given confusion matrix for a binaryclassifier. (5)

n=165	**Predicted: NO**	**Predicted: YES**
Actual: NO	50	10
Actual: YES	5	100

5 Which algorithm is a kind of backtracking algorithm that is used indecision making and game theory to find the optimal move for aplayer? What are the ALPHA cutoff and BETA cutoff? Apply ALPHA BETAcutoff algorithm and solve the following problem. (5)



6		

What are the limitations of Hill Climbing Techniques? Mention thestrategies to solve them. Also, convert the following statementsinto the First order predicate logic.

- Every student who walks talks. (5)
- All purple Mushrooms are poisonous..

-----End-----