

Tribhuvan University
Institute of Science and Technology
2079

Bachelor Level / fourth-semester / Science
Computer Science and Information Technology(CSC261)
Artificial Intelligence

Full Marks: 60 + 20 + 20
Pass Marks: 24 + 8 + 8
Time: 3 Hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Section A

Long Answer Questions.

- 1 Define admissible heuristic with an example. Explain the working mechanism and limitations of hill climbing search.
-

- 2 How do you define problem? What are criteria for defining problem? Compare Constraint Satisfaction Problem and Real World Problem in detail with appropriate example.
-

- 3 Define Expert System with example. What are stages of expert system development ? Explain.

Section- B

Short Answer Questions.

- 4 How syntactic and semantic analyses are performed in natural language processing?
-

How syntactic and semantic analyses are performed in natural language processing?

6

What is state space representation? Illustrate with one example.

7

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Convert Following Sentences into Predicate

8

a) All animal who can bark are dog.

b) Someone is firing a gun

c) All tigers are not fierce

9

Define game. Write the benefits and limitations of depth limited search.

10

What is fuzzy logic? Discuss the different operators used in genetic algorithm.

11

Give an example of reinforcement learning. Explain the types of ANN.

Writes short note of the following(any TWO)

12

a. Pragmatic Analysis

b. Unification and lifting

c. Turing test

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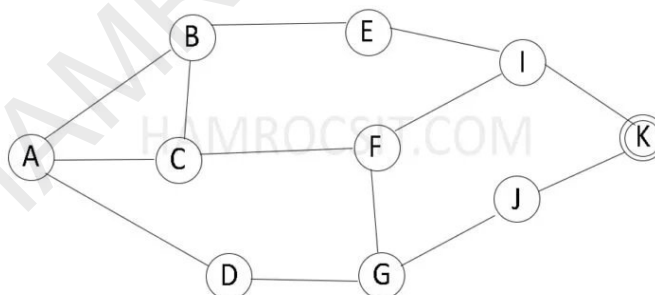
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Long Answer Questions

Attempt any two questions (2 x 10 = 20)

How informed search are different than uniformed? Given following stae space, illustrate how depth limited search and iterative depending dearch works? Use your own assumption for depth search.



Hence, A is start and K is goal.

Consider following facts

Every traffic chases driver. Every driver who horns is smart. No traffic catches any smart driver. Any traffic who chases some driver but does not catch him frusted.

Now configure FoPL knowledge base for above statements. Use resolution algorithm to draw a conclusion that "If all drivers horn, then all traffics are frusted."



3

Describe mathematical model of neural network. What does it mean to train a neural network? Write algorithm for perceptron learning.

Short Answer Questions

Attempt any eight questions (8 x 5 = 40)

4

What is Turing test? How it can be used to measure intelligence of machine?

5

How agent can be configured using PEAS framework? Illustrate with example

Construct semantic network for following facts

6

Ram is person. Persons are humans. All humans have nose. Humans are instances of mammals. Ram has weight of 60 kg. Weight of Ram is less than weight of Sita.

What is crossover operation in genetic algorithm? Given following chromosomes show the result of one-point and two-point crossover.

7

C1 = 01100010

C2 = 10101100

Choose appropriate crossover points as per your own suggestions.

8

What is expert system? How it works? Mention role of inference engine in expert system.

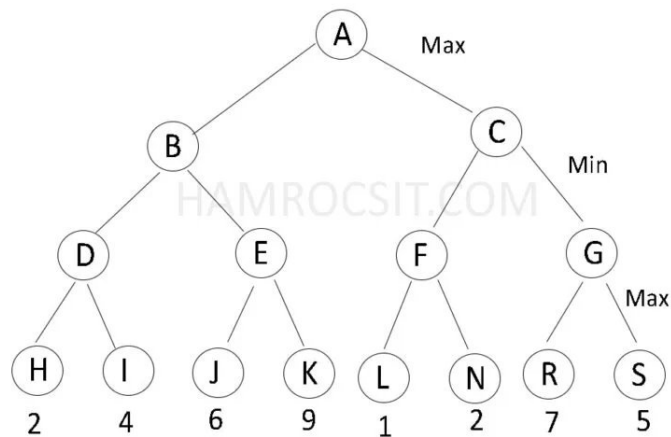
9

How semantic and pragmatic analysis is done in natural language processing.

10 How philosophy, sociology and economics influence the study of artificial intelligence?

Given following search space, determine if there exists any alpha and beta cutoffs.

11



12

What is posterior probability? Consider a scenario that a patient have liver disease is 15% probability. A test says that 5% of patients are alcoholic. Among those patients diagnosed with liver disease, 7% are alcoholic. Now compute the chance of having liver disease, if the patient is alcoholic.

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Group A

Attempt any Two questions (2x10=20)

1

Construct a state space with appropriate heuristics and local costs. Show that Greedy Best First search is not complete for the state space. Also illustrate A* is complete and guarantees solution for the same state space.

How resolution algorithm is used in FOPL to infer conclusion?

Consider the facts;

2

Anyone whom Pugu loves is a star. Any hero who does not rehearse does not act. Anmol is a hero. Any hero who does not work does not rehearse. Anyone who does not act is not a star. Convert above into FOPL and use resolution to infer that "If Anmol does not work, then Pugu does not love Anmol".

3

Define mathematical model of artificial neural network. Discuss how Hebbian learning algorithm can be used to train a neural network. Support your answer with an example.

Group B



Attempt any Eight questions. (8x5=40)

4 What is Ai? How can you define AI from the perspective of thought process?

5 Discuss the types of environment where an agent can work on.

6 Illustrate with an example, how uniform cost search algorithm can be used for finding goal in a state space.

7 Define frame. How knowledge is encoded in a frame? Justify with an example.

8 What do you mean by membership of an element in a fuzzy set? Given a domain of discourse $X=\{10, 20, 30, 40, 50, 60, 70\}$, construct a fuzzy set from X. Use your own assumptions for defining membership.

9 Write an algorithm for learning by Genetic Approach.

How uncertain knowledge is represented? Given following full joint probability distribution representing probabilities of having different sizes of CD, find the probability that a CD cover has a length of 130mm given the width is 15mm.

10	y=Width ↓	x=Length →		
		129	130	131
	15	0.12	0.42	0.06
	16	0.08	0.28	0.04

11 How the concept of machine vision are used in Robotics to configure sensors of Robots?

12 How syntactic and semantic analysis is done during natural language processing? Explain with example.

