

Tribhuvan University
Institute of Science and Technology
2068

Bachelor Level/ Third Year/ Fifth Semester/ Science

Full Marks: 60

Computer Science and Information Technology (CSc. 304)

Pass Marks: 24

(Artificial Intelligence)

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.

Attempt all the questions. (10x6=60)

1. What is Artificial Intelligence (AI)? Describe your own criteria for computer program to be considered intelligent.
2. For each of the following agents, determine what type of agent architecture is most appropriate (i.e. table lookup, simple reflex, goal-based or utility based).
 - a. Medical diagnosis system
 - b. Satellite image analysis system
 - c. Part-pricking robot
 - d. Refinery controller
3. What is state space representation of problem? Represent the root finding problem having four cities in to state representation (you can choose any ordering of cities and links) and devise the complete problem formulation.
4. What is heuristic information? Suppose that we run a greedy search algorithm with $h(n) = g(n)$ and $h(n) = g(n)$. What sort of search will the greedy search follow in each case?
5. State whether the following sentences are valid, unsatisfiable, or neither.
 - a. Smoke \Rightarrow Smoke
 - b. Smoke \Rightarrow Fire
 - c. (Smoke \Rightarrow Fire) \Rightarrow (\sim Smoke $\Rightarrow\sim$ Fire)
 - d. Smoke \vee Fire \vee \sim Fire
6. Consider the knowledge base:

“If it is hot and humid, then it is raining. If it is humid, then it is hot. It is humid”

 - a. Describe a set of propositional letters which can be used to represent the knowledge base.

- b. Translate the KB into propositional letters using your propositional letters from part a.
 - c. Is it raining? Answer this question by using logical inference rule with KB.
7. What do you mean by knowledge representation? Explain the characteristics of representation.
8. Define the Model-Based and Cased Based system. Discuss which system is suitable for the following problems.
- a. Electronic Circuit Testing
 - b. Legal Reasoning
 - c. Disease Recognition
9. What is Bayes' rule? Discuss the use of Bayes' rule for uncertain reasoning.
10. After your yearly checkup, the doctor has bad news and good news. The bad news is that you tested positive for a serious disease, and the test is 99% accurate (i.e. the probability of testing positive given that you have the disease is 0.99, as is the probability of testing negative if you don't have the disease). The good news is that this is a rare disease, striking only one in 10,000 people.
- a. Why is it good news that the disease is rare?
 - b. What are the chances that you actually have the disease?