Computer Science & Business Systems

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - VI CS&BS : WINTER: 2025
SUBJECT: ITC-IV: ARTIFICIAL INTELLIGENCE

Day : Tuesday
Date : 02/12/2025

W-24183-2025

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labelled diagrams **WHEREVER** necessary.
4) Assume suitable data, if necessary.

Q. 1 Discuss the tic-tac-toe problem in detail and explain how it can be solved using AI techniques. **(10)**

OR

Q. 1 Define Agents and Environments in AI? Explain different environments in AI. **(10)**

Q. 2 What is A* Algorithm in Artificial Intelligence? Explain A* Algorithm with example. **(10)**

OR

Q. 2 What is Greedy Best First Search? Explain with an example the different stages of Greedy Best First search. **(10)**

Q. 3 Explain Alpha – Beta Pruning with example in Artificial Intelligence. **(10)**

OR

Q. 3 Explain constraint satisfaction problems in Artificial Intelligence and give precise formulation for following as constraint satisfaction problem: **(10)**

a) Rectilinear floor-planning: find non-overlapping places in a large rectangle for a number of smaller rectangles.

b) Class scheduling: there is a fixed number of professors and classrooms, a list of classes to be offered, and a list of possible time slots for classes. Each professor has a set of classes that he or she can teach.

c) Hamiltonian tour: given a network of cities connected by roads, choose an order to visit all cities in a country without repeating any.

Q. 4 List different approaches to knowledge representation. Explain any one knowledge representation approach in detail. **(10)**

OR

Q. 4 Define First-Order Logic in Artificial Intelligence. Consider a vocabulary with the following symbols: **(10)**

Occupation (p, o) : Predicate. Person p has occupation o.

Customer (p1, p2) : Predicate. Person p1 is a customer of person p2.

Boss (p1, p2) : Predicate. Person p1 is a boss of person p2.

Doctor, Surgeon, Lawyer, Actor : Constants denoting occupations.

Emily, Joe : Constants denoting people.

P. T. O.

Use these symbols to write the following assertions in first-order logic:

a) Emily is either a surgeon or a lawyer.

b) Joe is an actor, but he also holds another job.

c) All surgeons are doctors.

d) There exists a lawyer all of whose customers are doctors.

e) Every surgeon has a lawyer.

Q. 5 What is a Bayesian networks? Explain in detail how it is used in representing the uncertainty about knowledge. **(10)**

OR

Q. 5 In local nuclear power station, there is an alarm that senses when a temperature gauge exceeds a given threshold. The gauge measures the temperature of the core. Consider the Boolean variables A (alarm sounds), FA (alarm is faulty), and FG (gauge is faulty) and the multivalued nodes G (gauge reading) and T (actual core temperature).

a) Draw a Bayesian network for this domain, given that the gauge is more likely to fail when the core temperature gets too high. **(05)**

b) Suppose there are just two possible actual and measured temperatures, normal and high; the probability that the gauge gives the correct temperature is x when it is working, but y when it is faulty. Give the conditional probability table associated with G. **(05)**

Q. 6 What is an Expert System? Discuss in detail any five applications of expert system. **(10)**

OR

Q. 6 Describe the phases of designing an expert system. Explain limitations of Expert System. **(10)**

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