

B.E / B.Tech (Full-time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2011
COMPUTER SCIENCE AND ENGINEERING BRANCH

26

FIFTH SEMESTER

CS9304 – ARTIFICIAL INTELLIGENCE

REGULATIONS 2005

Time : 3 hrs

Max Mark : 100

Answer ALL Questions

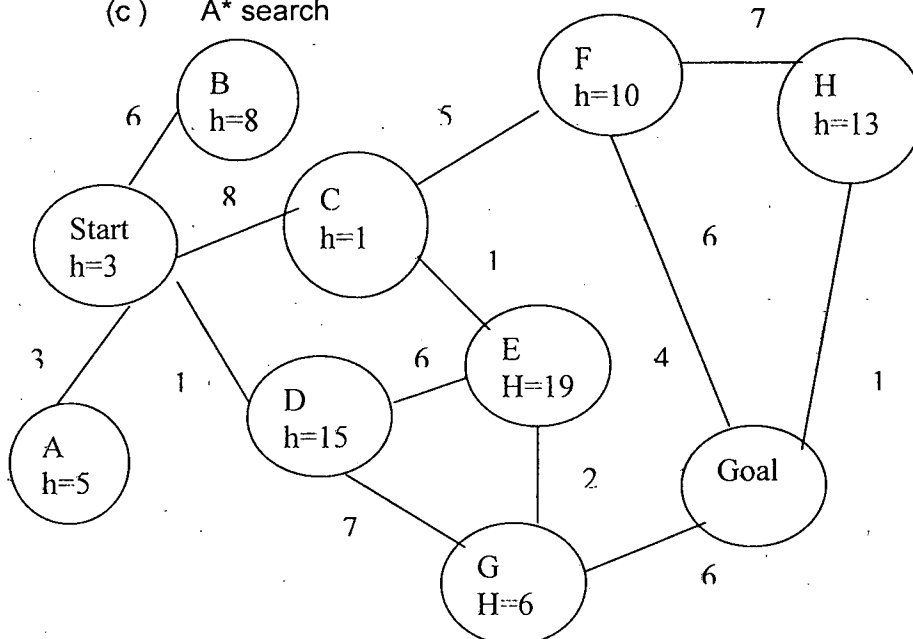
Part – A (10x2 = 20Marks)

- Develop a PEAS description for the following task environment - Internet book – shopping agent.
- Define in your words the following terms: Artificial Intelligence, State space, Successor function and branching factor.
- Distinguish between model-based agent and goal-based agent.
- Give the graph of state space vs objective function and explain the concepts of hill-climbing.
- What is the need for conversion into clausal form before undertaking first order resolution?
- Why is organization of objects into categories needed?
- Discuss the notion of Occam's Razor.
- Define the active-value function Q used in Re-enforcement learning.
- Explain the different types of ambiguity associated with Natural language processing
- Explain the Lens System associated with Image formation.

Part – B (5x 16 = 80 Marks)

11(i) For the given graph find the distance (Optimum distance) from start to goal node using

- | | | |
|-----|--------------------------|-----|
| (a) | Iterative Deeping | (3) |
| (b) | Greedy best first search | (3) |
| (c) | A* search | (3) |



- (ii) Explain the general model of a utility based agent (3)
- (iii) Compare and contrast search and game trees. (4)

- 12.a(i) Write a program that will take as input two web page URLs and find a path of links from one to another. What is the appropriate search strategy? Is Bidirectional search a good idea? (3)
- (ii) Discuss the minimax algorithm in detail. (8)
 - (iii) Explain how alpha beta pruning is used to prune search. (5)

(or)

- 12.b(i) Give precise formulations for the following as a constraint satisfaction problem
Jug Problem: You have three jugs, measuring 2 liters, 8 liters and 3 liters and a water tap. You can fill the jugs up or empty them out from one to another or onto the ground. You need to measure out exactly 1 liter. (7)
- (ii) Explain clearly any three heuristics used in constraint satisfaction problem using example given in 12 b (i). (4)
 - (iii) Explain how genetic algorithms can be used for search. (5)

- 13.a(i) Represent the following sentences in first order logic using a consistent vocabulary (which you must define).
 No person buys an expensive policy.
 - There is an agent who sells policies only to people who are not insured.
 - A person born in UK, each of whose parents is a UK citizen or a UK resident is a UK citizen by birth.
 - There is a barber who shaves all men in town who do not shave themselves. (8)
- (ii) Write a PROLOG program delete list (X,Y,Z) which deletes all occurrences of X(a list) from a list Y and gives a resultant list Z. Show the trace and output given X & Y and given only Y.

(or)

- 13.b(i). Explain the concepts of Horn clause Unification, Resolution and back tracking in the context of first order predicate logic with suitable illustrative examples. (6)
- (ii) Explain with a diagram predicates to define time intervals. (4)
 - (iii) Given the full joint distribution shown below: (6)

	Toothache		7 toothache	
	Catch	7 catch	catch	7 catch
Cavity	0.108	0.012	0.072	0.008
7 cavity	0.016	0.064	0.144	0.576

Calculate the following:

$P(\text{toothache})$, $P(\text{cavity})$, $P(\text{toothache}/\text{cavity})$, $P(\text{cavity}/\text{toothache} \vee \text{catch})$.

- 14.a(i) Discuss the Decision-Tree algorithm in detail explaining clearly how attributes are chosen at each level of the decision tree. (12)
- (ii) Explain how the applicability of decision trees can be broadened. (4)

(or)

- 14.b(i) Discuss in detail passive reinforcement learning. (4)
- (ii) Discuss in detail how utility function can be determined using least Mean Square,

Adaptive Dynamic Programming and Temporal Difference. (8)
(iii) Explain active reinforcement learning. (4)

- 15.a (i) Explain in detail the seven process associated with informing task of communication using an illustrative example. (10)
(ii) Discuss the concepts of edge detection and image segmentation. (6)

(or)

15.b Write short notes on:-

- (i) Extracting three-dimensional information. (8)
(ii) Robots planning to move. (8)