

Total No of Questions: [12]

SEAT NO. :  

[Total No. of Pages : 3 ]

**B.E. 2008 (Information Technology)**  
**Artificial Intelligence**  
**(Elective - I) (Semester - I)**

Time: 3 Hours

Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume Suitable data if necessary

**SECTION I**

- Q1) a) What is Artificial Intelligence? Explain any five applications of Artificial Intelligence in brief. [8]
- b) What is agent? Consider an Internet Shopping Agent and answer the following: [8]
- (i) What are the percepts for this agent?
  - (ii) Characterize the operating environment.
  - (iii) What are the actions the agent can take?
  - (iv) How can one evaluate the performance of the agent?
  - (v) What sort of agent architecture do you think is most suitable for this agent?

**OR**

- Q2) a) Differentiate between an agent and an object. What are different types of environment in which agents are called to work? [8]
- b) Explain Swarm Intelligence Systems. Explain how such concepts are used to make machines intelligent? [8]
- Q3) a) What is heuristics? Explain it with suitable example. For each of the following type of problems give good heuristic functions: [8]
- i) Block World problem
  - ii) Missionaries and Cannibals
- b) "The Best-First search technique is a better approach". Explain and justify your answer to the above statement. [8]

**OR**

- Q4) a) What is the benefit of using alpha-beta pruning on minimax game tree? Explain with suitable example. Are there any factors on which this benefit depends? [8]
- b) What do you mean by Hill climbing search technique? Explain the term local maxima and plateau associated with it. [8]
- Q5) a) Differentiate between forward and backward reasoning. When you are reaching home from an unknown place; which of the reasoning is applied (forward/backward)? Justify your answer with reason. [6]
- b) Discuss with suitable examples the scope and limitations of knowledge representation using Propositional Logic and First Order Predicate logic. [6]
- c) Briefly describe the following phases of Natural Language Processing: [6]



		i) Morphological Analysis ii) Semantic Analysis	
		<b>OR</b>	
Q6)	a)	What do you understand by Unification in predicate logic? Give an example to illustrate.	[6]
	b)	Express the following sentences in predicate logic formulae: i) All people who are not poor are smart and happy. ii) Those people who read are not stupid. iii) Many can read and is wealthy. iv) Happy people have exciting lives. v) Anybody who is wealthy is not poor. vi) Shaila is wealthy but not happy.	[6]
	c)	Develop a concise semantic net for the following facts:- Pigeons lay eggs. Parrots can fly. Pigeon is a bird. Owl is a bird. Parrots lay eggs. Owl sleep during daytime. Pigeons and parrots sleep during night. Owls lay eggs. Pigeons and owls can fly. Parrots are green. Parrots are birds.	[6]
		<b>SECTION II</b>	
Q7)	a)	Given the following Initial and Goal State for the Block's World Problem. Construct a set of operators (rules) and hence generate a plan to reach the goal state from the initial state. <b>Initial State:</b> $\text{ontable}(A) \wedge \text{ontable}(B) \wedge \text{on}(C,B) \wedge \text{clear}(A)$ <b>Goal State:</b> $\text{ontable}(B) \wedge \text{on}(C,B) \wedge \text{on}(A,C) \wedge \text{clear}(A)$ where $\text{ontable}(X)$ : Block X is on top of the table $\text{on}(X,Y)$ : Block X is on top of block Y $\text{clear}(X)$ : There is nothing on top of block X; therefore it can be picked up $\text{handempty}$ : You are not holding any block	[9]
	b)	What is the significance of planning in Artificial Intelligence system? Explain the main components of a planning system.	[9]
		<b>OR</b>	
Q8)	a)	Consider the following block world problem where we wish to proceed from the start to goal state <div style="display: flex; justify-content: space-around; align-items: center; margin: 10px 0;"> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">C</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">A</div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">D</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">B</div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">B</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">A</div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">C</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">D</div> </div> </div> <div style="display: flex; justify-content: space-around; width: 100%;"> <span><b>Start</b></span> <span><b>Goal</b></span> </div> Describe the start and goal states for the above problem using STRIPS types of the operator. Also specify the precondition of the first operator used for solving the first goal of the goal stack planning.	[9]
	b)	Write short notes on : i) Image formation ii) Least commitment strategy iii) Object recognition	[9]
Q9)	a)	What is Hopfield network? How it is used in learning a network?	[8]
	b)	What is an Expert System? Briefly describe five major components of an expert	[8]



		system. Using a suitable query, explain the working of an inference engine in rule based expert system	
		<b>OR</b>	
Q10)	a)	Explain the role of knowledge in design of expert system. Explain the architecture of expert system.	[8]
	b)	What if a neural network is given no feedback for its input, not even a real valued reinforcement? Can network learn anything useful? Explain.	[8]
Q11)	a)	Explain recursive rules, syntax and meaning of prolog program. Give suitable example.	[8]
	b)	Write brief notes on following with respect to Prolog: i) Cuts ii) Recursion	[8]
		<b>OR</b>	
Q12)	a)	What is logic programming? Explain how facts and rules are represented in Prolog.	[8]
	b)	Write brief notes on followings: i) Genetic Algorithms ii) Distributed AI	[8]