B.Sc. (HONS.) IN CSE PART-IV SEVENTH SEMESTER EXAMINATION, 2013

CSE-413

(Artificial Intelligence and Neural Network)

Examination Code : 617

Time—3 hours

Full marks—80

[N.B.—The figures in the right margin indicate full marks. Answer any **four** *questions.]*

Marks

1. *(a)* Distinguish between 'Knowledge and Intelligence'. State and briefly discuss the major historical events of AI in chronological order. 3+4=7

(b) What do you know about Turing test regarding AI? Discuss. 4

(c) List out some of the application of AI. 4

(d) Mention the operators used in Genetic Algorithm. Explain any two. 5

2. *(a)* Discuss the following search technique with the help of an example. Also discuss the benefits and shortcoming of each :— 3+3=6

(i) Breadth First Search;

(ii) Depth First Search.

(b) What is meant by heuristic function and explain heuristic for constraint satisfaction problem? 1+3=4

(c) List the criteria to measure the performance of different search strategies. What is the difference between uninformed and informed search strategies? 2+3=5

(d) Write A* algorithm and show how A* algorithm can be used to find minimal-cost overall path or simply any path as quickly as possible. 5

3. *(a)* How does hill climbing ensure greedy local search? Discuss some of the potential problems of using hill climbing search. Give an examples of the problems cited. 2+4=6

(b) What is a Real World Problem? How to formulate a concise problem out of it for solving a RWP? 1+4=5

(c) Define alpha-beta pruning and give the order modifications to be minimax procedure to improve its performance. 5

(d) What is intelligent Agent? Discuss about simple reflex agents. 1+3=4

[Please turn over

Marks

4. *(a)* What are the differences between propositional logic and predicate logic? Mention the basic components of propositional logic. 2+3=5

(b) What is inference rule? Discuss the rules of inference (any two) in propositional logic. 1+4=5

(c) Discuss different types of knowledge. 5

(d) Translate the following sentences into formulas in predicate logic :— 5

(i) All elephants are grey;

(ii) Sue eats everything bill eats;

(iii) Nobody likes to be poor;

(iv) Everyone is loyal to someone;

(v) Caesar was a ruler.

5. *(a)* Give a simple mathematical model for a neuron. 4

(b) Mention the various types of learning paradigms in an ANN. Discuss any one. 2+4=6

(c) Explain the back propagation algorithm of learning in a multilayer neural network. 6

(d) What is reinforcement learning? Compare supervised learning and unsupervised learning. 2+2=4

6. *(a)* A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. What will be the output? 5

(b) What is fuzzy logic? How it is used for decision making under uncertainty? 2+2=4

(c) Explain Modus-Ponens and And-Elimination inference rules. 2+3=5

(d) Explain in detail the utility based reflex agent. 6

B.Sc (HONS.) IN CSE PART-IV SEVENTH SEMESTER EXAMINATION, 2012

ARTIFICIAL INTELLIGENCE AND NEURAL NETWORK

CSE-413

Examination Code : 617

Time—3 hours

Full marks—80

[N.B.—The figures in the margin indicate full marks. Answer any **four** *questions.]*

			Marks
1.	*(a)*	Define Artificial Intelligence. How do you prove that a machine can be worked as an intelligent system?	1+5=6
	(b)	Briefly discuss the importance of Artificial Intelligence system.	6
	(c)	What would be the components of a complete artificial intelligence system? Explain.	8
2.	*(a)*	What is Intelligent agent? Mention different kinds of agent and discuss any one of them.	1+6=7
	(b)	Explain PEAS description of the task environment for an automated taxi driver agent.	7
	(c)	Discuss different types of agent environment.	6
3.	*(a)*	What is DFS? Write down the algorithm of DFS with an example.	8
	(b)	Discuss Iterative Deeping DFS and compare it to DFS with respect to computational cost.	4
	(c)	Write the algorithm of A* and explain it with an example.	8
4.	*(a)*	Discuss various approaches and issues in knowledge representation.	5
	(b)	What is Fuzzy logic? Explain basic Fuzzy set operations.	2+5=7
	(c)	Translate the following sentences into FOPL :—	4
		(i) The car painted white belongs to me.	
		(ii) Man is mortal.	
		(iii) Horses are faster than cows.	
		(iv) Everybody like an honest man.	
	(d)	What is wff? What are the properties of wffs?	2+2=4

[Please turn over

Marks

5. *(a)* What is Artificial Neural Network (ANN)? Draw an analogy between artificial neural network and biological neural network. 2+3=5

(b) Briefly explain the McCulloch-Pitts Neuron model. 5

(c) Write the steps of perceptron's training algorithm. 6

(d) Explain why a perceptron can learn the operations of AND, OR but not X-OR. 4

6. Write short notes (any **four**) :— 5×4=20

(a) Expert system;

(b) Inference rules;

(c) Reinforcement learning;

(d) Multilayer feedforward Neural Network;

(e) Heuristic search;

(f) Genetic algorithm.

B.Sc (HONS.) IN CSE PART-IV, SEVENTH SEMESTER EXAMINATION, 2011

Subject Code: CSE-413

(Artificial Intelligence & Neural Network)

Time—3 hours

Full marks—80

[N.B.—The figures in the right margin indicate full marks. Answer any **four** *questions of the following.]*

		Marks
1.	(a) Distinguish between knowledge and intelligence. List out some of the applications of Artificial Intelligence (AI).	5
	(b) State the capabilities that a computer should possess for conducting a Turing test.	5
	(c) List the characteristic features of an expert system.	5
	(d) Discuss the factors that play a roles in the design of a learning system.	5
2.	(a) State and explain the criteria that are used for evaluating search strategies.	6
	(b) What are the advantages of DFS over BFS? What are the key differences between Depth-first search and Depth-limited search?	3+3=6
	(c) Prove that A* search is optimal and complete.	8
3.	(a) What is blind search? What is meant by 'admissible heuristics'?	4
	(b) Why do we need 'uniform cost search'? Write down its merits and demerits.	6
	(c) Evaluate the best first search using four evaluation criteria.	5
	(d) Explain simulated annealing search.	5
4.	(a) Translate the following sentences into first order logic:— (i) All dogs are mammals; (ii) Fido is a dog; (iii) Fido is a mammal; (iv) All mammals produce milk.	4
	(b) Use the Modus Ponens deduction rules to deduce sentence *(iii)* from *(i)* and *(ii)*.	5
	(c) Write the answers from part *(a)* in conjunctive normal form.	5
	(d) Translate the following sentence into CNF: "There exists a dog which does not produce milk."	6

[Please turn over

Marks

5. *(a)* Draw a flowchart of basic genetic algorithm. 6

(b) Explain the genetic operators used in GA 6

(c) Find the maximum value of the following function using GA — 8

$F(x) = 31x - x \wedge 2$ where $x \in [0 --31]$

6. *(a)* What is neural network? Describe the working principle of a artificial neural network with diagram. 5

(b) What do you mean by learning and recall? Differentiate between supervised and unsupervised learning. 5

(c) Explain the Back-propagation learning algorithm with an example. 6

(d) What is perception? How does the perception learn? 4

Natural langua: proce
Knowledge represent
Automatic reasoning
machine learning
Computer vision
Robotic

B.Sc (HONS.) IN CSE PART-IV, SEVENTH SEMESTER EXAMINATION, 2010

CSE-413

(Artificial intelligence and Neural Network)

Time—3 hours

Full marks—80

[N.B.—The figures in the right margin indicate full marks. Answer any four of the following questions.]

Marks

1. (a) What is the meaning of 'Artificial Intelligence'? Mention the places of AI in Computer Science. 2+2=4

   (b) Define 'Intelligent Agents'. What are the potential utilization areas of intelligent agents? 2+2=4

   (c) Briefly describe utility-based agents. 6

   (d) Distinguish between contingency problem and exploration problem with respect to problem solving by searching. 6

2. (a) What is Knowledge? How can we represent knowledge? 2+2=4

   (b) What is Fuzzy Logic? Mention some application of Fuzzy logic. 2+2=4

   (c) Determine whether each of the following sentences is (*i*) Satisfiable; (*ii*) Contradictory or (*iii*) Valid :— 6

   $S1$: $(P \ \& \ Q) \longrightarrow R \vee (\sim Q)$

   $S2$: $(P \vee Q) \ \& \ (P \vee \sim Q) \vee P$

   $S3$: $P \longrightarrow Q \longrightarrow \sim P$

   $S4$: $P \vee Q \ \& \sim P \vee \sim Q \ \& \ P$.

   (d) Write down the predicate logic of the following statements :— 6

   (*i*) Everyone taking AI will pass the exam;

   (*ii*) The car painted white belongs to me;

   (*iii*) No employee earns more than the president;

   (*iv*) Man is mortal.

3. (a) Differentiate among Breadth-first and Depth-first search. Explain how uniform cost search works. 4+3=7

   (b) "Iterative deepening search combines the benefits of depth-first and breadth-first search"—Explain how. 5

   (c) How should you deal with repeated states in a search strategy? 3

   (d) Describe the behaviours of A* search. 5

[Please turn over

Marks

4. (*a*) What is meant by well formed formula? Describe the connectives and quantifiers used in predicate calculus. 3+5=8

   (*b*) Define substitution and unification. Describe how composition of substitution can be found by giving an example. 2+4=6

   (*c*) Convert the following wff into clause form:- 6

   $(\forall x)(\exists y)\ \{[P(x, y) \Rightarrow Q(y, x)] \wedge [Q(y, x) \Rightarrow S(x, y)]\} \Rightarrow (\exists x)(\forall y)$ $[P(x, y) \Rightarrow S(x, y)]$.

5. (*a*) What is Genetic Algorithm? Briefly discuss crossover and mutation operators with example. 2+4=6

   (*b*) Explain roulette wheel method used in GA. 5

   (*c*) What is informed-search? Discuss Hill climbing search in a nutshell. What are the limitations of Hill-climbing search? How can you overcome these? 2+4+3=9

6. (*a*) Draw and explain the operation of a biological neuron. 5

   (*b*) Explain the answer extraction method using resolution refutation. 4

   (*c*) Define and explain a single layer feed-forward network with diagram. 5

   (*d*) Show the classification of learning algorithms used in neural network. 6