Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: MAY 2017

(Regulation 2014)

Sixth Semester

COMPUTER SCIENCE AND ENGINEERING

U14CST601**:** Artificial Intelligence

COURSE OUTCOMES

CO1: Describe the modern view of AI as the study of agents that receive percepts from the environment and perform actions.

CO2: Demonstrate awareness of informed search and exploration methods.

CO3: Explain about AI techniques for knowledge representation, planning and uncertainty Management.

CO4: Develop knowledge of decision making and learning methods.

CO5: Describe the use of AI to solve English Communication problems.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match list 1 (SEARCH ALGORITHMS) with list 2 (TIME COMPLEXITY) and select the correct answer using the codes below the list: CO2 [K_3]

b- branching factor, **l** – depth limit, **m** – maximum depth, **d** - depth

List I	List II
A. Breadth First Search	i. $O(b^m)$
B. Depth First Search	ii. $O(b^l)$
C. Depth Limited Search	iii. $O(b^{d/2})$
D. Bidirectional Search	iv. $O(b^{d+1})$

	A	B	C	D
a)	iii	iv	ii	i
b)	iv	i	ii	iii
c)	iii	ii	iv	i
d)	iv	iii	ii	i

2. _____ holds the complete history of everything the agent has ever perceived. CO1 [K_1]

a) Percept Record b) Percept sequence

c) Percept history d) Meta-data

3. Which of the following is true for neural networks? CO5 [K_2]

1. The training time depends on the size of the network.
2. Neural networks can be simulated on a conventional computer
3. Artificial neurons are identical in operation to biological ones.
4. Neural networks can be programmed.

a) 2,4 b) 1,3

c) 3,2 d) 1,2

4. Learning a continuous valued function is called _____ CO4 [K_2]

a) Classification b) Regression

c) Induction d) Inference

5. Assertion (A): Chess is a competitive multi-agent environment CO1 [K_3]
Reason (R): In competitive multi-agent environment, agent avoids collisions and maximizes performance measure of all agents.

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false d) A is false but R is true

6. _____ grammars are the most restricted class and every rule has a single nonterminal on the left-hand side, and a terminal symbol optionally followed by a nonterminal on the right-hand side CO5 [K_2]

a) Recursively enumerable b) Context-sensitive

c) Regular d) Context-free

7. Arrange the following components of plan to derive Partial order planning. CO3 [K_2]

1. Open Preconditions
2. Causal Links
3. Ordering Constraints
4. Set of actions

a) 4-1-2-3 b) 4-3-2-1

c) 1-4-3-2 d) 1-3-4-2

8. If there are no cycles in the ordering constraints and no conflicts with the casual links, then the plan is said to be _____. CO3 [K_2]

a) Constraint plan b) Inconsistent plan

c) Consistent plan d) Causal Plan

9. Assertion (A): A* algorithm is optimally efficient — CO2 [K_2]

Reason (R): Any algorithm that expands all nodes with f(n) < C* helps to obtain optimal solution

a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

10. _____ learning is an area of machine learning inspired by behaviorist psychology concerned with how agents ought to take actions in an environment so as to maximize cumulative reward. — CO4 [K_2]

a) Supervised
b) Unsupervised
c) Reinforcement
d) Inductive

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Define Problem formulation for vacuum world toy problem. — CO1 [K_2]
12. State PEAS or PAGE description for Wumpus world. — CO1 [K_2]
13. Give the semantics of the universal and existential quantifiers. — CO2 [K_2]
14. Explain Hill climbing search. — CO2 [K_2]
15. Represent the following sentences in Propositional Logic: — CO3 [K3]

There is a breeze in [1,1] if and only if there is a pit in [1,2] or [2,1]

There is no pit in [1,1]

She is brilliant and humble.

If there is Wumpus in [1,1] , then there is stench in [1,2] and [2,1]

16. Write an algorithm to define generic knowledge-based agent. — CO3 [K2]
17. Let's think a domain consisting of three binary variables:Toothache, Cavity, and Catch, and assume the full joint probability distribution is a table as follows. — CO4 [K_3]

	toothache		*¬toothache*	
	catch	*¬catch*	*catch*	*¬catch*
cavity	0.108	0.012	0.072	0.008
¬cavity	0.016	0.064	0.144	0.576

Compute the following probabilities.

a. P(cavity | toothache)=?

b. P(cavity V toothache)=?

c.

18.	How do you represent a decision problem using decision networks?		CO4	[K_2]
19.	Differentiate between active and passive reinforcement learning.		CO5	[K_2]
20.	Illustrate the two models of communication.		CO5	[K_2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21.	Discuss in detail about heuristic search strategies with suitable examples.		CO2	[K_2]
22.	a. Illustrate the four basic types of agent structures in any intelligent system. Explain how you can convert them into a learning agent.	(10)	CO1	[K_2]
	State the properties of environment for Automated Taxi Driving Agent.	(4)	CO1	[K_3]
23.	a. Apply First order Resolution to convert the given FOL to CNF: $\forall x\ [\forall y\ Animal(y) \Rightarrow Loves(x,y)] \Rightarrow [\exists y\ loves(y,x)]$	(10)	CO3	[K_3]
	b. Convert following statements to FOL	(4)	CO3	[K_3]
	1. Everyone in the world is loved by at least one person. 2. All sons of kings are princes. 3. A person can vote in India only if he is above 18 years and is an Indian citizen. 4. Robert likes all kinds of food.			
24.	Explain the semantics of bayesian networks and illustrate the methods for computing exact inference using Bayesian networks.		CO4	[K_2]
25.	Explain GRAPHPLAN algorithm and concepts of mutex relations using Spare tire problem?		CO3	[K_2]
26.	Describe how Decision Trees could be used for inductive learning. Explain its effectiveness with a suitable example?		CO4	[K_2]
27.	i) Explain about the types of communicating agents.	(7)	CO5	[K_2]
	ii) Briefly explain the concept of artificial neural networks to achieve intelligence.	(7)	CO5	[K_2]

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