RAMAIAH
Institute of Technology

MAKEUP EXAMINATIONS – FEBRUARY 2020

Program	: B.E. : Computer Science and Engineering	**Semester** : **V**
Course Name	: **Artificial Intelligence**	**Max. Marks** : **100**
Course Code	: **CSE02**	**Duration** : **3 Hrs**

Instructions to the Candidates:
- Answer one full question from each unit.
- Use suitable examples and diagrams wherever necessary to support your answers.

UNIT- I

1.	a)	Define AI. Discuss the foundations and applications of AI.	CO1	(10)
	b)	Give the initial state, goal test, operators, path cost function for the 8 puzzle problem and write the state space diagram.	CO1	(10)
2.	a)	Explain A* search algorithm with an example.	CO1	(10)
	b)	Compare DFS and Iterative deepening DFS. Explain Iterative deepening DFS with an example.	CO1	(10)

UNIT- II

3.	a)	Define Horn clause and give examples.	CO2	(05)
	b)	Put the following predicate calculus expression in clause form: $\forall(X)(p(X) \rightarrow \{\forall(Y)[p(Y) \rightarrow p(f(X,Y))] \wedge \neg\forall(Y)[q(X,Y) \rightarrow p(Y)]\})$	CO2	(09)
	c)	Convert the following into predicate logic: i) All lions are fierce. ii) Some lions do not drink coffee. iii) Some fierce creatures do not drink coffee.	CO2	(06)
4.	a)	Answer the query, using technique of resolution by refutation: Anyone passing his history exams and winning the lottery is happy. But anyone who studies or is lucky can pass all his exams. Amit did not study but he is lucky. Anyone who is lucky wins the lottery. Is Amit happy?	CO2	(12)
	b)	Illustrate the procedure of converting any given sentence into Conjunctive Normal form (in propositional Logic).	CO2	(08)

UNIT- III

5.	a)	Describe the differences and similarities between problem solving and planning.	CO3	(05)
	b)	Consider the below training dataset to draw the decision tree. (i) Compute the entropy of the collection of training examples with respect to the target function classification? (ii) Compute the information gain of A2 relative to these training examples?	CO3	(08)

Instances	Classification	A1	A2
1	-	F	F
2	-	F	F
3	+	F	T
4	-	T	T
5	+	T	F
6	+	T	F

c) The task of finding and removing apples that house worms before they get to the grocery store is a big problem. Consumers have been shown to react poorly upon finding worms in their apples. To combat this problem. Wormfinder Inc. has developed an amazing new non-intrusive test for worms in apples. This test is, called WormScan has the incredible false negative rate of exactly 0 (i.e., if an apple is declared by WormScan to be free of worms, it is guaranteed to have no worms in it). Unfortunately, such a performance comes with a cost; the false positive rate is 3% (i.e., 3% of all good apples are marked as having a worm inside). Statistically, it has been found that 0.2% (1 in 500 apples) have worms.   CO3   (07)
 (i) What percentage of the apples will test as having worms?
 (ii) Given that an apple has tested as having worms, what is the probability that there is a worm inside?

6. a) Define Bayes' rule. Give example.   CO3   (05)
   b) Differentiate supervised and unsupervised learning techniques. State example in each case.   CO3   (08)
   c) Stating the case study of tooth ache problem, explain how inference can be done using full joint distribution.   CO3   (07)

UNIT- IV

7. a) Describe the significance of N-gram models in NLP? Why is the task of feature selection and preprocessing of data necessary in the process?   CO4   (10)
   b) Discuss how the process of text classification is handled in NLP. Explain the process of classifying an email as a spam or not-spam (Ham), with an example.   CO4   (10)

8. a) Develop a parse tree for the sentence "Cat slept on the table" using the following rules.   CO4   (07)

$$S \rightarrow NP\ VP$$
$$NP \rightarrow N$$
$$NP \rightarrow DET\ N$$
$$VP \rightarrow V\ PP$$
$$PP \rightarrow PREP\ NP$$
$$N \rightarrow Cat\ |\ table$$
$$V \rightarrow slept$$
$$DET \rightarrow the$$
$$PREP \rightarrow on$$

   b) John wants to develop autocomplete functionality in search application. He considered the below text for training language model to find out the conditional on previous words.   CO4   (08)
   Alice was beginning to get very tired of sitting by her sister on the bank, and of having nothing to do: once or twice she had peeped into the book her sister was reading, but it had no pictures or conversations in it, 'and what is the use of a book,' thought Alice 'without pictures or conversation?'
   Calculate the probability of the next word, given the previous word.
   i. $P(W_{i+1} = pictures\ |\ W_i = without)$
   ii. $P(W_{i+1} = book\ |\ W_i = the)$
   iii. $P(W_{i+1} = sister\ |\ W_i = her)$
   iv. $P(W_{i+1} = conversation\ |\ W_i = or\ AND\ W_{i-1} = pictures)$
   c) Define information retrieval process in NLP. How are information retrieval systems characterized?   CO4   (05)

UNIT- V

9. a) Formulate any two tasks of computing which would be possibly solved   CO5   (10)
   by applying the philosophy of biological ants and explain the same.
   b) Compare the advantages of using genetic algorithm approach over   CO5   (10)
   artificial Neural Networks to solve the network topology selection
   problem and finding the optimal set of weights problem.

10. a) Discuss in detail the subsumption and pipeline robot architectures. Also   CO5   (12)
   state one application area where each of them would be suitable.
   b) Discuss the Significance of genetic operators.   CO5   (08)

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