

Model Answer for Question Bank Paper

Department of CSIT

MCA Semester: III Year:2013 Paper Title: Artificial Intelligence and Expert Systems Max Marks: 60

Section A: (All 10 questions are compulsory)

10X2=20

Very Short Answer Questions: Write very short answers to following questions. Please attempt questions of Section A, together and write proper question number for each answer.

The lecture notes (LN) are available on GGU site via link <http://www.ggu.ac.in/download/Class-Note13/Artificial%20Intelligence%20and%20Expert%20System24.10.13.pdf>, pl. see this link wherever mentioned in the answer as LN (page ..)

1. What was the aim of Turing test towards understanding intelligence?

Basically Alan Turing(1950) proposed a test with an aim to test the intelligence property of a human. If an interrogator (a machine or a person ideally) asks some question at one end of a wall or separating zone and the answer is given at the other end of the wall, the interrogator has the impression as if answer is given by an intelligent person, then the machine according to him is an intelligent.

2. Write at least two achievements obtained using AI.

Here achievements mean what has been achieved using AI not what are areas of study. Pl. see LN page 12, such as Robotics, Deep Blue, driverless car, games etc.

3. In water jug problem, show by example, meaning of rule: $(x, y):\{ \text{if } x + y \geq 4, y > 0 \} \rightarrow (4, y - (4 - x))$

If sum of both (4 and 3 Lt) water jugs is more than or equal to 4, and 3 Lt jug has some water in it, then fill 4 Lt jug to its capacity of 4 Lt and leave remaining water (if any) in 3 Lt jug.

4. In water jug problem, show by example, meaning of rule: $(x, y):\{ \text{if } x + y \leq 4, y > 0 \} \rightarrow (x + y, 0)$

If sum of both (4 and 3 Lt) water jugs is less than or equal to 0 and 3 Lt jug has some water in it, then pour all water of 3 Lt in to 4 Lt Jug leaving 3 Lt jug empty.

5. Draw a truth table for the conjunction of propositions P and Q.

$P \wedge Q$ for T/F values as $(T \wedge T): T$; $(T \wedge F)$ is F; $(F \wedge T)$ is F; $(F \wedge F)$ is F (Dont use 0/1 in place of T/F)

6. Convert into clause form (i) $\neg(a \wedge b)$ (ii) $A \rightarrow B$

$\neg(a \wedge b)$ is $\neg a \vee \neg b$ (b) $A \rightarrow B$ is $\neg A \vee B$

7. Define supervised classification with an example.

Pl. see LN page 82-86

8. Define the term pattern, features and class and write a sample pattern.

Pattern is the object/article/ etc which has some shape and size and can be expressed. Features are the attributes or properties of this pattern. The class is the group in which a pattern belongs to. Example can be given for a fruit classification

P#	Color	Size	Texture	class
P1	1 (Red)	4	Smooth	Apple
P2	2 (yellow)	3	Smooth	guava

9. Write any two differences between traditional computer system programs and expert systems.

Traditional computer systems do not exhibit any intelligence whereas expert systems do. Traditional computer systems require Data Structures and algorithm to form a program whereas an expert system requires inference engine and knowledge to develop an expert system.

10. What is an inference engine?

An inference engine is used to use the knowledge available in a knowledge base or otherwise and able to answer the queries like a search engine, mainly used in an expert system

Section B: (Attempt any 4 questions out of 7 questions)

4X10=40

Descriptive Questions:

1. Discuss any four applications of AI with examples.

Pl. see LN page 9 and elaborate. Can take similar other applications.

2. Explain the meaning of a production system in Artificial Intelligence with example. What are the main components of a production system, write in details about each component?

See LN page 18 onwards. Write production rules for some problem (e.g. water jug problem). Write all 4 components and their details.

3. Discuss the breadth first and depth first search with example, tree diagram and algorithm.

See LN page 24 onwards. Draw full BFS and DFS trees (not incomplete), write algorithms with time, advantages and disadvantages of both techniques.

4. Write in the context of predicate logic, the meaning of following terms with examples when you convert wff into clause form (a) Associative property (b) Distributive property (c) DeMorgans's laws (d) prenex norm form.

See LN page 63 onwards especially 63,64 for these answers.

5. Write short notes on (a) feature selection (b) feature extraction.

(a) Feature selection: In a pattern classification problem, usually unknown pattern (whose classes are not given) are asked to be predicted for their class. For various cases, the databases have redundant features and classification becomes in-accurate. In such cases, it is advised to reduce the number of features so that the classifier classifies the unknown pattern more accurately. Selection of features or a subset of features from a complete set of features is called feature selection. Take some example showing a set of patterns, find out the class of a test pattern with full set of features and then take with a reduced set of features. Test the performance of the classifier under two cases. K-nn can be used a simple classifier to perform the test.

(b) Feature Extraction: In some cases, the existing set of features is not suitable to give good classification accuracy for a classifier. Rather than, if the existing features are processed and create modified features then features in the modified form can be better choice than in their original forms. Modifying or processing features to create new features is called feature extraction process. Principal Component Analysis (PCA) is commonly used for feature extraction process. Take some example and use some technique to generate new features from existing. This is the main difference between feature selection and feature extraction processes.

6. Describe k-nn technique with example for classification.

Pl. see LN page 85 onwards. Take some example and solve completely for testing the class of an unknown pattern by taking training and test data patterns.

7. Explain the roles of a knowledge engineer, domain expert and an end user in an expert system.

Pl. see LN pages 93 onwards, elaborate as explained in class earlier.