CBCS SCHEME

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18AE643

Sixth Semester B.E. Degree Examination, July/August 2022
Artificial Intelligence and Expert Systems

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Elucidate State Space Approach with suitable examples. **(10 Marks)**

b. Explain Breadth first search algorithm with an example. Mention its advantages and disadvantages. **(10 Marks)**

OR

2 a. Explain A_0* algorithm, clearly elucidate how the search process is happening in problem space. **(10 Marks)**

b. Explain the constraint satisfaction algorithm with suitable example. **(10 Marks)**

Module-2

3 a. List and explain the issues in knowledge representation. **(15 Marks)**

b. Consider a normal chess board from which two squares, in opposite corners are eliminated. The task is to cover all remaining square with dominoes, each of which covers two square. No overlapping either of dominoes on top of each other or of dominoes over boundary of the mutilated board are allowed. Can this task be done? **(05 Marks)**

OR

4 a. Consider the following knowledge base:

$\forall x : \forall y : \text{Cat}(x) \wedge \text{fish}(y) \rightarrow \text{likes-to-eat}(x, y)$

$\forall x : \text{Catuo}(x) \rightarrow \text{Cat}(x)$

$\forall x : \text{tuna}(x) \rightarrow \text{fish}(x)$

Tuna (Charlie)

Tuna (Hub)

Catuo (Puss)

(i) Convert these wff's into Horn clauses.

(ii) Convert Horn clauses into PROLOG program

(iii) Write another PROLOG program that corresponds to same set of wff's but returns different answer to same query. **(12 Marks)**

b. Elucidate whether search should proceed forward or backward for following problems:

(i) Water – Jug problem

(ii) Block world

(iii) Natural language processing **(08 Marks)**

Module-3

5 a. Define non-monotonic systems. Briefly describe about key issues that need to be addressed while designing non monotonic reasoning systems. **(08 Marks)**

b. Consider the problem of Nick, the Quakes and Republican, which has been written using different kind of AB predicate as,

$\forall x$: Republican (x) $\wedge \neg$ AB_1 (x) $\rightarrow \neg$ pacifist(x)

$\forall x$: Quakes (x) $\wedge \neg$ AB_2 (x) $\rightarrow \neg$ pacifist(x)

Republican (x)

Quakes (x)

Answer the following queries:

(i) Write down smallest model you can that describe the two extension that we computed for knowledge base.

(ii) Does it make sense to say that either is smaller the other?

(iii) How could you use idea of prioritized circumscription to indicate a preference for extension? **(12 Marks)**

OR

6 a. Write a short note on Bayesian networks and Dempster Shafer theory. **(10 Marks)**

b. Using Mycin's rule for inexact reasoning, compute CF, MB, MD of h. Given three observations:

CF (h_1, o_1) = 0.5

CF (h_2, o_2) = 0.3

CF (h_3, o_3) = 0.2 **(10 Marks)**

Module-4

7 a. State where in CYC ontology following concepts must fall:

(i) Cat

(ii) Court case

(iii) New York times

(iv) France

(v) Glass of water **(10 Marks)**

b. List out any five structures in which knowledge can be represented. **(05 Marks)**

c. Give five examples that are difficult to represent and manipulate in predicate logic. **(05 Marks)**

OR

8 a. Elucidate Alpha-beta cutoff technique in AI with suitable example. **(12 Marks)**

b. Elucidate the concept of goal stack planning. **(08 Marks)**

Module-5

9 a. Give the factors that makes understanding Hard. Briefly discuss about steps involved in Natural Language Processing. **(10 Marks)**

b. In the following paragraph, show the antecedents for each pronouns. What knowledge is necessary to determine each?

John went to store to buy a shirt. The salesclerk ask him if he could help him. He said he wanted blue shirt. The sales clerk found one and tried it on. He paid for it and left. **(10 Marks)**

OR

10 a. Explain the concept of distributed representation. **(10 Marks)**

b. Write short notes on following:

(i) Connectionist AI

(ii) Symbolic AI **(10 Marks)**

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