
CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF
SCIENCE IN COMPUTER SCIENCE

COSC 841: ARTIFICIAL INTELLIGENCE

STREAMS: MSC. COMP SCI Y1S2 P/T

TIME: 3 HOURS

DAY/DATE: THURSDA 8/08/2019

2.30 P.M -5.30 P.M.

INSTRUCTIONS:

- Answer Question **ONE** and any other **TWO** questions.
- Diagrams should be used whenever they are relevant to support an answer.
- Sketch maps and diagrams may be used whenever they help to illustrate your answer
- Do not write anything on the question paper
- This is a **closed book exam**, No reference materials are allowed in the examination room
- There will be **No** use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely

SECTION A

ANSWER **ALL THE QUESTIONS IN THIS SECTION**

QUESTION ONE [30 MARKS]

- a) Highlight the role of knowledge in Artificial Intelligence [2 Marks]
- b) Identify and explain any six characteristics of an effective Knowledge Engineer [3 Marks]
- c) Briefly describe the Turing Test and highlight its contribution to Artificial Intelligence [3 Marks]
- d) Explain the difference between forward chaining and backward chaining and then describe situations where each one is more appropriate [4 Marks]
- e) Stemming and Lemmatization are both processes in NLP

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- i. Differentiate between Stemming and Lemmatization [2 Marks]
- ii. Assuming you are developing an ecommerce website, explain how Stemming and Lemmatization would influence the site [4 Marks]
- f) Machine Learning can be classified as Supervised or Unsupervised Learning. Differentiate between the two strategies [4 Marks]
- g) Describe two advantages and two disadvantages of Frames as methods of knowledge representation [4 Marks]
- h) Write Prolog statements to present the following knowledge
 - i. A parent relationship [2 Marks]
 - ii. A full sibling relationship [2 Marks]

SECTION B

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO [15 MARKS]

- a) Deep Mind later named Deep Blue was one of the early chess playing computers that is famous for defeating the then reigning champion Gary Kasparov in a chess game. Computers can now play chess at grand master level, but it is not clear whether this involves intelligence. Discuss whether chess computers such as Deep Blue do, or do not, involve any intelligence, and what has been the impact of such computers to research in Artificial Intelligence. [10 Marks]
- b) Transfer of knowledge from a human to a machine is said to be more difficult than transfer of knowledge from a human to a human. Discuss. [5 Marks]

QUESTION THREE [15 MARKS]

- a) Researchers have pointed out that Knowledge Acquisition is mostly considered the bottleneck in the development of Knowledge Based System.
 - i. Explain any four reasons why this may be so [4 Marks]
 - ii. Giving an appropriate example, describe the protocol analysis method of knowledge acquisition [4 Marks]
- b) Chuka University is interested in realistic applications of Artificial Intelligence. Giving an example for each case identify where the following Artificial Intelligence systems may mostly be applied at the University:
 - i. Case Based Reasoning Systems [2 Marks]
 - ii. Artificial Neural Networks [3 Marks]
 - iii. Expert Systems [2 Marks]

QUESTION FOUR [15 MARKS]

a) Consider the following information

“In the animal world, carnivores such as lions and leopards hunt and eat herbivores such as zebras and wild beast. Thus some animals are hunters and some are hunted, and generally speaking carnivores hunt herbivores. However there are many exceptions to this rule. Elephants, which are herbivores, are rarely hunted because of their size. Nor are bears, which are not normally meat eaters and therefore basically herbivores. Bears will catch and eat other animals when opportunity arises.”

- i. Represent the knowledge above using a semantic network [7 Marks]
- ii. Describe any three weaknesses of semantic networks [4 Marks]

b) Using speech communication as the user interface could increase willingness to use expert systems. Do you agree or disagree with the above statement? Explain your answer [5 Marks]

QUESTION FIVE [15 MARKS]

a) Explain the role of the following in Natural Language Processing:

- i. POS Tagging [3 Marks]
- ii. Tokenization [2 Marks]

b) A physician - after having examined a particular patient in his office - gets a reminding to a patient that he treated two weeks ago. Assuming that the reminding was caused by a similarity of important symptoms (and not the patient's hair-color, say), the physician uses the diagnosis and treatment of the previous patient to determine the disease and treatment for the patient in front of him.

- i. Explain why the above situation qualifies as a Case Based Reasoning scenario [4 Marks]
 - ii. Diagrammatically present and explain the life cycle of a Case based reasoning system referencing the scenario above [6 Marks]
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