

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATIONS**

**THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE AWARD OF  
BACHELOR OF SCIENCE COMPUTER SCIENCE / BACHELOR OF SCIENCE  
APPLIED COMPUTER SCIENCE**

**COSC 341: ARTIFICIAL INTELLIGENCE**

**STREAMS: BSC (COSC, ACSC)**

**STREAMS: 2 HOURS**

**DAY/DATE: WEDNESDAY 08/04/2020**

**11.30 AM – 1.30 PM**

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**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) A CASE based Reasoning system is one example of a Knowledge Based System. Draw the life cycle diagram of a CASE based reasoner and use to explain how such systems work. [6 Marks]
- b) Sophia the humanoid social robot has become among the most recognizable robots.
- i. Highlight three firsts achieved by Sophia as a robot. [3 Marks]

- ii. Referencing Sophia, identify any three reasons why social robots are importance in the modern world. [3 Marks]
- c) A burger is food. Pizza as well is food and a sandwich is food too. While a sandwich can be taken for lunch, Pizza is best suited for dinner. However anything is a meal if at all it is food. Create a prolog knowledge base of the given knowledge. [6 Marks]
- d) List and briefly describe the process of Knowledge Engineering. [5 Marks]
- e) A personality namely Gary Kasparov is a person of interest in Artificial Intelligence. Explain why this is so. [4 Marks]
- f) Describe any three disadvantages of the protocol analysis method. [3 Marks]

## SECTION B

### ANSWER ANY TWO QUESTIONS FROM THIS SECTION

#### QUESTION TWO [20 MARKS]

- a) Marcus Brutus and Julius Ceaser are reknown figures from Ancient Roman history. The following is a fragment of knowledge from their history. “Marcus was a man. Marcus was a Pompeian. All Pompeians were Romans. Caesar was a ruler. Marcus tried to assassinate Caesar. All men are persons. The height of Marcus was 72”.
  - i. Convert the above fragment to a semantic network [4 Marks]
  - ii. Convert the semantic network in i) above into a prolog knowledge base [8 Marks]
- b) Assuming you are developing an ecommerce website, explain how Stemming and Lemmatization would influence the site. [2 Marks]
- c) One of the important tasks in a Natural Language Processing application is that of Tokenization
  - i. Highlight the role of tokenization in Natural Language Processing. [2 Marks]
  - ii. Referencing the NLTK library, write a program that takes in an input string, performs word tokenization and displays the output. [4 Marks]

#### QUESTION THREE [20 MARKS]

- a) Machine Learning is a branch of Artificial Intelligence which is gaining importance especially in the age of big data and with advanced computing technologies

- i. Identify the three types of machine learning and briefly describe each type [6 Marks]
- ii. Discuss any four broad application areas of Machine Learning [4 Marks]
- b) By use of an example differentiate between proposition logic and predicate logic as methods of knowledge representation. [6 Marks]
- c) Acquiring knowledge from experts is not an easy task. Identify any four reasons why this is so. [4 Marks]

**QUESTION FOUR [20 MARKS]**

- a) Describe Searle's Chinese room experiment and consequently discuss how it affects Artificial Intelligence research. [8 Marks]
- b) The following is knowledge given to one who wants to invest.

“IF a person has \$10,000 to invest and she has a college degree, THEN she should invest in securities. IF a person's annual income is at least \$40,000 and she has a college degree, THEN she should invest in growth stocks. IF a person is younger than 30 and she is investing in securities, THEN she should invest in growth stocks. IF a person is younger than 30 and older than 22, THEN she has a college degree. IF a person wants to invest in a growth stock, THEN the stock should be IBM.”

Assuming a certain person has \$10,000 and is aged 25 years, let a rule based Artificial Intelligence system advice the investor whether or not to invest in IBM stock by use of:

- i. Forward Chaining [6 Marks]
- ii. Backward Chaining [6 Marks]

**QUESTION FIVE [20 MARKS]**

- a) Allan Turing is considered among the fathers of Artificial Intelligence. Describe any two reasons why he is considered as such. [6 Marks]
- b) Artificial Intelligence systems are considered as search problem solvers.
  - i. Referencing a typical Expert system explain why AI systems are considered search problem solvers [2 Marks]
  - ii. List and explain any three search strategies associated with Artificial Intelligence [6 Marks]
- c) Giving an example, explain the following Prolog components
  - i. Term [2 Marks]

- ii. Variable
- iii. Atom

[2 Marks]

[2 Marks]

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