CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR THE AWARD OF BACHELOR OF SCIENCE COMPUTER SCIENCE

MAIN CAMPUS

COMP 416: KNOWLEDGE BASED SYSTEMS

STREAMS: BSC. COMPUTER SCIENCE

TIME: 2 HOURS

DAY/DATE…

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) Explain the role of knowledge in Artificial Intelligence [3 Marks]

b) Differentiate between:
   i. Information and Knowledge [2 Marks]
   ii. Tacit Knowledge and Explicit Knowledge [2 Marks]
   iii. Knowledge Engineer and the Inferencing Engine [2 Marks]

c) Describe two challenges of rule based Expert Systems [3 Marks]

d) Compare CASE based reasoning to human expert reasoning [4 Marks]

e) List and explain any five application areas of Artificial Neural Networks [5 Marks]

f) Describe the Protocol Analysis method of knowledge acquisition [4 Marks]

g) Describe the Phone Call Test of Knowledge Based Systems [5 Marks]

SECTION B

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO [20 MARKS]

a) Explain in brief each of the following areas of Natural Language Processing giving a suitable example of their application and use
   i. Sentiment Analysis [3 Marks]
   ii. Text Classification [3 Marks]
   iii. Web Based Question Answering [2 Marks]

b) Referencing Jane Austen's "Persuasion" as the training corpus, write a program that can predict the word that follows a given word. Use this predictor to generate a random sentence of 20 words. [8 Marks]

c) Highlight two reasons why Sophia the Robot was developed [4 Marks]

QUESTION THREE [20 MARKS]

a) AutoExpress Limited is an Automobile Selling Company. To improve customer service, the company is planning to reward customers who purchase a vehicle from them with basic vehicle diagnostic ability. The company plans to do this through an expert system. You have been contracted to develop the expert system. Describe the steps you will take to do so [10 Marks]

b) You are given the sentence “The Quick Brown Fox Jumped Over The Lazy Dog”. Write code to tokenize the sentence into words [4 Marks]

c) Identify any three corpora that ships with NLTK and briefly explain their usage [6 Marks]

QUESTION FOUR [20 MARKS]

a) A popular story goes that when the saying "The spirit is willing, but the flesh is weak" was translated by a computer into Russian and back into English, it was rendered as “The wine is good, but the meat is spoiled". Referencing this example describe any five challenges faced to reasonably achieve Natural Language Processing [10 Marks]

b) List and explain five methods used for knowledge elicitation [10 Marks]

QUESTION FIVE [20 MARKS]

Agriculture means food, jobs and income for many people. However at times farmers face challenges which could be attributed to traditional cultivation methods that might not always result in good yield; unavailability of experts and non-optimum utilization of tools and techniques. Farmers require timely, accurate and location specific information in relation with different aspects of farming like the pests, diseases, weeds and fertilizer management, etc. for their crops from agricultural experts. But agricultural experts may not always be available. To provide such information and to achieve an optimal crop plan, computer-based systems termed as Advisory Systems could be utilized. An advisory system supports the farmers in getting expert advices on many activities in a farming process. With this system, farmers can access virtual agricultural experts as and whenever needed.

a) Explain why CASE Based Reasoning Systems could be a technology of choice in the implementation of the Advisory System [5 Marks]

b) Use a diagram to explain the usage of the implemented Advisory System referencing the Case Based Systems life cycle [10 Marks]

c) Highlight the weaknesses of Case Based Reasoning Systems [5 Marks]