MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2023/2024 ACADEMIC YEAR

FOURTH YEAR **FIRST** SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN SOFTWARE ENGINEERING AND BACHELOR OF SCIENCE IN COMPUTER SCIENCE

SCS 401 – KNOWLEDGE BASED SYSTEMS

DURATION: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Answer question one and any other TWO Questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A – ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Define the terms Expert System and Search Algorithm as used in knowledge based systems. (4 marks)
b) Explain the three challenges of knowledge based systems. (6 marks)
c) Using relevant examples, differentiate the following terms, declarative knowledge and tacit knowledge. (3 marks)
d) Explain two roles of knowledge in artificial intelligence. (4 marks)
e) Using examples, explain three problems encountered by knowledge engineers when representing knowledge in knowledge based system. (6 marks)
f) List any three logical symbols used in the language of first order logic. (3 marks)
g) Translate the following sentences into first order logic (4 marks)
    i. S1: There is a person who is loved by everybody
    ii. S2: It is not true that everybody loves somebody

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a) Differentiate between the following terms as used in knowledge based systems. (4 marks)
    i. Forward chaining and backward chaining
    ii. Semantic net and frame
b) Explain why knowledge acquisition is often referred to as the ES bottleneck. (2 marks)
c) Describe any four expert system development stages. (8 marks)
d) Use a truth table to determine whether the following statement is a tautology, contradiction or contingent statement. Explain your answer. "If I have money and I have transport, then I don't have money or I don't have transport". (4 marks)
e) Differentiate breadth first search and depth first search. (2 marks)

QUESTION THREE (20 MARKS)

a) Discuss the three forms of reasoning used in design of expert system. (6 marks)
b) Outline three techniques which could be used for knowledge elicitation in an automated disease diagnosis system. (6 marks)
c) Use a truth table to determine if the following statements are logically equivalent. (6 marks)

    If I study, I pass
    If I don't pass, then I study
d) Highlight two characteristics of an agent. (2 marks)

QUESTION FOUR (20 MARKS)

a) Represent the following sentences in predicate logic
   i. Someone is a programmer (2 marks)
   ii. Ann loves someone (2 marks)

b) Uncertainty, sometimes occurs due to interaction between different rules about the same information which then are not always compatible. Name any four reasons why this conflict can occur. (4 marks)

c) With the advancement of cloud technology, new possibilities for the application of knowledge based systems have opened up. Describe two knowledge based systems application which have been made possible by the availability of cloud technology. (4 marks)

d) Explain the two parts of knowledge representation language. (4 marks)

e) State two types of agent environment suitable for an internet shopping system. Justify your answer. (4 marks)