



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

**OPEN, DISTANCE AND E-LEARNING EXAMINATION FOR THE DEGREE
OF BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)**

SIT 410: KNOWLEDGE BASED SYSTEMS

DATE: Saturday 5th February 2011

TIME: 8.00a.m -10.00a.m

Instructions: Answer The First Question and any Other Two Questions.

Question One

- a) Define the following terms: (6marks)
- (i) Artificial intelligence
 - (ii) State space search
 - (iii) Fuzzy logic systems
- b) Distinguish the following terms: (12marks)
- (i) Knowledge Based and Expert systems
 - (ii) Propositional Logic and Predicate Logic
 - (iii) Data driven and Goal Driven reasoning
- c) Represent the following statements in predicate logic: (6marks)
- (i) Nobody likes paying taxes
 - (ii) If wishes were horses beggars could ride
 - (iii) If it rains tomorrow, Tom will carry an umbrella
- d) Suppose you have been given the task to develop Knowledge Based systems for you Organization. Briefly discuss the processes or stages you would go through to develop one. (6mks)

Question Two

- a) Draw the structure of an expert system stating the function of each part. (8marks)
- b) Discuss how knowledge based systems may be used in the following areas: (6mks)
- (i) Medicine
 - (ii) Commerce
- c) Compare and contrast depth first search and breadth first search algorithm. (6 marks)

Question Three

- a) Explain the term knowledge acquisition. (1mark)
- b) State and explain any three methods used in acquiring knowledge. (9 marks)
- c) By using a relevant example explain how PROLOG can be used to implement rule-based systems. (10 marks)

Question Four

- a) Explain two applications of Genetic algorithms. (4marks)
- b) Give one advantage and one disadvantage of using the following knowledge representation methods: (4marks)
 - (i) Frames
 - (ii) Semantic networks
- c) Explain the meaning of the terms “inference”, “backward chaining”, and “ forward chaining” (3marks)
- d) Let the following propositions be symbolized as follows:
 - A: interest rate falls
 - B: Bond prices increase
 - C: interest rate increases
 - D: Bond prices decline
 - E: interest rate unchanged
 - F: Bond prices remain unchanged
 - G: the shillings rising against other currencies
 - H: the shillings falls against other currencies
 - I: buy bonds

Let the following rules apply:

- R1: if A then B R2: if C then D R3: if E then F R4: if G then A
- R5: if H then C R6: if D then I

Use backward chaining inference strategy to advice you clients whether to buy bond given one pays more shillings for other currencies (9marks)

Question Five

- a) Explain two applications of Fuzzy logic (4mks)
- b) Show the truth values of the following prepositional calculus/logic sentences:
 - (i) $\neg P \wedge Q \Rightarrow R$; where P and R have truth value F and Q has truth value T
 - (ii) $\neg(P \wedge Q) \vee (P \wedge R)$; where P,Q and R have truth value T
 - (iii) $(Q \Rightarrow R) \wedge (R \Rightarrow Q)$; where R has truth value F and Q has truth value T (7marks)
- c) The blind search algorithms, also known as uninformed search algorithms have a possibility of wasting search time by expanding states that have already been encountered and expanded before on some other path. Explain the approaches that can be utilized to deal with this problem. (9 marks)