TECHNICAL UNIVERSITY OF MOMBASA

INSTITUTE OF COMPUTING AND INFORMATICS

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR:

BSC. INFORMATION TECHNOLOGY

ICS2405: KNOWLEDGE BASED SYSTEMS

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2HOURS

DATE: Pick Date Apr 2016

Question ONE

(a) Briefly outline the criteria necessary for building successful Knowledge Based Systems within commercial organizations [10]

b) Knowledge based Systems (KBSs) are developed to deal with particular application domains in which alternative techniques are unable to produce reliable and manageable solutions. Identify and discuss five aspects of human intelligence that could be used to characterize intelligent knowledge-based systems.[10 Marks]

c) Convert the following to standard predicate logic using predicates [10 marks]
   ✓ Someone walks and talks.
   ✓ Someone walks and someone talks.

✓ Anyone who loves everyone loves himself.
✓ If anyone cheats, everyone suffers.
✓ Everyone who Mary loves loves someone who is happy.

Question TWO

(a) It is claimed that knowledge acquisition is a major bottleneck in building Knowledge Based Systems. Discuss the basis for making this statement. [5]

b) The knowledge embedded in Knowledge Based Systems (KBS) is frequently incomplete, inconsistent and incorrect. Given this, to what extent do you feel users of KBS should believe the outcomes from such systems? Justify the position you adopt. [5]

4. Knowledge based Systems (KBS) are developed to deal with particular application domains in which elements of human intelligence are essential in producing solutions.

   i.   Identify and discuss five aspects of human intelligence that could be used to characterize intelligent knowledge-based systems [10 Marks].

Question THREE

a)   Using appropriate examples differentiate between the following:
   (i)   Forward chaining and backward chaining.   (4 Marks)
   (iii)   Declarative and procedural knowledge   (4 Marks)
   iii)   Knowledge based systems and information systems   (4 Marks)

   b) . Describe briefly general methods that could be applied to elicit the knowledge needed to solve a small complex problem. **(8 marks)**

Question FOUR

a) Describe the main differences between *rules* and *mathematical logic* (in particular predicate logic) with respect to the representation and processing of knowledge. What are the respective advantages and problems?[8 Marks]

b) Draw a figure, and describe the components of a Knowledge Based System and their relationships.[8 Marks]

c) Convert the following to standard predicate logic using predicates
   - ✓ Everyone who walks is calm.
   - ✓ No one who runs walks.
   - ✓ Someone walks and someone talks.[6 Marks]

Question FIVE

a) Tasty (cheese)
   Tasty (bread)
   Made-from (cheese, milk)
   Made_from (bread, flour)
   Has(milk,calcium)
   Has(flour,carbohydrate)

   Based on the facts above formulate a rule based clause using X,Y,Z to show that bread contains carbohydrate, therefore bread is made from flour and flour has carbohydrate [4 marks]

b) The following symbols ∃ and ∀ are used in predicate calculus sentences. What are the name given to each of these symbols and what are the differences between them? [6 marks]

c) Prolog clauses can either be facts or rules. What is the difference between a fact and a rule. Give an example of each   [6 marks]

d) Define the following terms in predicate calculus :
   i.   Variable symbols   [2 marks]
   ii. Function symbols   [2 marks]