



*(Knowledge for Development)*  
**KIBABII UNIVERSITY**

**UNIVERSITY EXAMINATIONS  
2020/2021 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATIONS  
YEAR TWO SEMESTER TWO EXAMINATIONS**

**FOR THE DEGREE OF BACHELOR OF SCIENCE  
COMPUTER SCIENCE**

**COURSE CODE : CSC 227**  
**COURSE TITLE : LOGIC PROGRAMMING**

**DATE: 13 /01/2022**                      **TIME: 11:00 A.M – 1:00 P.M**

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**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTIONS ONE AND ANY OTHER TWO.**

**QUESTION ONE (COMPULSORY) [30 MARKS]**

- a. Define following terms: [4 Marks]
- i Prolog
  - ii Proposition
  - iii Predicate
  - iv Modus ponens
- b. Anyone who loves Jane is brave. Translate this to a predicate logic. [4 Marks]
- c. Explain briefly: *Predicates, facts, constants, variables* as use in prolog [4 Marks]
- d. Put the following statements into conjunctive normal form, and also disjunctive normal form. Check that each statement has the same truth table as its conjunctive normal form.
- i  $(\neg a \wedge b) \rightarrow \neg b$
  - ii  $(a \wedge ((\neg p) \leftrightarrow \neg q))$
- [6 Marks]
- e. Find clausal form for  $((a \vee b) \rightarrow c)$  [4 Marks]
- f. Translate the following statements into some first order language. [8 Marks]
- i. Not all toothless animals which have feathers can fly.
  - ii. If some human being is in prison then all human beings are in prison.
  - iii. It is not true that every short person who is not crazy likes some other person who is either not short or crazy.
  - iv. There is a town in Kenya in which there is a barber who shaves everyone in the town who does not shave themselves.

**QUESTION TWO [20 MARKS]**

- a. With relevant signatures, discuss the various components of Logic Program [8 Marks]
- b. Discuss Characteristics of Prolog [4 Marks]
- c. What is an inference, discuss various Inferencing techniques as used in logic programming? [8 Marks]

### QUESTION THREE [20 MARKS]

- a. Explain the concepts in propositional and predicate calculus. [4 marks]
- b. Translate the following into some first order language. In each case, give the signature of the language. Where there seems to be ambiguity in the English, point this out and explain which possibility you have chosen [6 marks]
- If some of Al's chickens have mange, then all of Al's chickens have mange.
  - Some people like other people who do not like anyone.
  - George must be eliminated unless Alice only saw one kangaroo.
- c. Define the term Resolution and explain the Resolution Principle [6 marks]
- d. What are the main Steps for Resolution [4 marks]

### QUESTION FOUR [20 MARKS]

- a. Outline the Syntax and Semantics as used in in prolog. [4 marks]
- b. Explain how logical agents and goal-based agent can be realized using logic programming. [8 marks]
- c. A university was planning to model a filtering agent. The agent tasks is to display lectures and their specific course they teach, students and their specific courses they take, students and their respective year of study. Using this information, write a prolog program to implement the agent's database of facts and rules. [8 marks]

### QUESTION FIVE [20 MARKS]

- a. Explain how logic-based inference strategies works. [6 marks]
- b. Use a logic programming language to implement logical reasoning systems that depicts at least eight different diseases, their prevention and treatments plans. [8 marks]
- c. Discuss briefly the application areas of prolog [6 marks]