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(University of Choice)

**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS  
2022/2023 ACADEMIC YEAR**

**THIRD YEAR EXAMINATIONS**

FOR THE DEGREE

IN

INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT

**COURSE CODE: BIK 313**

**COURSE TITLE: KNOWLEDGE-BASED SYSTEMS**

**DATE: 19/12/2022**

**TIME: 8:00-10:00AM**

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**INSTRUCTIONS TO CANDIDATES**

a) Answer Questions ONE and ANY OTHER TWO.

**TIME: 2 Hours**

## Question 1 COMPULSORY (30 MARKS)

- a) The domain of Artificial Intelligence can be broadly divided into five prospering domains. Briefly explain these five areas and giving an example of where each of these areas is applicable. **(15 marks)**
- b) Briefly explain what the Turing test is and how it is used to determine the intelligence of a machine. **(6 marks)**
- c) A machine or a system is artificially intelligent when it is equipped with five intangible properties of intelligences in it. State and briefly explain these five properties **(5 marks)**
- d) Briefly define the terms **data, information, expertise** and **knowledge** with respect to knowledge-based systems **(4 marks)**

## Question 2 (20 MARKS)

- a) In the robotics field of AI, locomotion is the mechanism that makes a robot capable of moving in its environment. Name four types of locomotion. **(3 marks)**
- b) The number of possible events (gaits) of robots is directly proportional to the number of legs. Calculate the number of possible events for a robot that has:
  - 1 leg
  - 2 legs
  - 3 legs**(9 marks)**
- c) Briefly describe any four areas where robotics can be applied **(8 marks)**

## Question 3 (20 MARKS)

- a) Briefly describe with the use of a diagram, the main components and working principle of an expert (knowledge-based system). **(12 marks)**
- b) Forward Chaining and Backward Chaining are strategies used by an expert system to provide results. Briefly explain these two strategies giving examples of each. **(8 marks)**

## Question 4 (20 MARKS)

- a) Explain what fuzzy logic means and the working principle of fuzzy logic in respect to Artificial Intelligence. **(6 marks)**
- b) The Fuzzy Logic Systems Architecture has four main parts. Explain with the help of a diagram the fuzzy logic system architecture. **(10 marks)**
- c) Briefly outline one application area where fuzzy logic can be implemented. **(4 marks)**

### **Question 5 (20 MARKS)**

- a) Briefly define the concept of machine learning **(3 marks)**
- b) Explain, using a diagram, how machine learning is related to Artificial Intelligence and Deep Learning **(6 marks)**
- c) Classical machine learning is often categorized by how an algorithm learns to become more accurate in its predictions. Briefly explain these four learning categories. **(6 marks)**
- d) Machine learning is a buzzword for today's technology, and it is growing very rapidly day by day. Briefly explain any five trending real-world applications of Machine Learning. **(5 marks)**