



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SIT241/SCO205: FOUNDATIONS OF ARTIFICIAL INTELLIGENCE

DATE: 8/12/2021

TIME: 2.00-4.00 PM

INSTRUCTIONS: Answer Question ONE and other TWO Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) State three types of knowledge (3 marks)
- b) Explain three applications of Artificial Intelligence: (6 marks)
- c) Discuss modus ponens knowledge inference technique as proposed by De' Morgan. (4 marks)
- d) Distinguish between actuator and sensor as used in AI (4 marks)
- e) Differentiate brute force and heuristic search. (4 marks)
- f) Analyze a vacuum tube cleaner agent using the PAGE description model. (4 marks)
- g) Jack wants to develop an intelligent system to be deployed for weather prediction:
 - i) Explain the type of machine learning he can use to train the system. (2 marks)
 - ii) Explain an algorithm that falls in the category of e (i) above. (3 marks)

QUESTION TWO (20 MARKS)

- a) Explain three hill climbing techniques (6 marks)
- b) Discuss three ways in a search algorithm can be evaluated. (6 marks)
- c) You have been selected to be part of the team that is assigned the task of developing a knowledge-based system. Describe the phases your team must undertake in the process of acquiring knowledge for the system. (8 marks)

QUESTION THREE (20 MARKS)

- a) Distinguish between syntax and semantic analysis in AI. (4 marks)
- b) Show the validity of the following statements using truth tables.
- i). $\neg P \vee Q \wedge \Rightarrow R$ (3 marks)
- ii). $\neg(P \wedge Q) \vee (P \wedge Q) \wedge R$ (3 marks)
- c) State four languages that are used to develop intelligent systems (4 marks)
- d) Discuss backward chaining as an inferencing technique. (6 marks)

QUESTION FOUR (20 MARKS)

- a) Distinguish between symbolic and non-symbolic computing (4 marks)
- b) Frames and Semantic networks are knowledge representation schemes. Briefly explain any three advantages for each of these schemes. (6 marks)
- c) Write the following statements in predicate Logic:
- i. Some dogs bark. (2 marks)
- ii. Barking dogs are irritating. (3 marks)
- d) Show how production rules can be used in reasoning using an illustration. (5 marks)

QUESTION FIVE (20 MARKS)

- a) Draw a semantic network that includes the following objects: Jane, Machakos University, Ministry of Education, KUCCPS, Machakos County. (6 marks)
- b) Given the 8-puzzle problem below, show how to move from the initial state to the goal state using heuristic function. (8 marks)

Initial State

1	2	3
5	6	4
8		7

Goal State

1	2	3
4	5	6
7	8	

Analyze the student's steps.

- c) Discuss the Alpha Beta Pruning method for game playing. (6 marks)