



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 205: FOUNDATIONS OF ARTIFICIAL INTELLIGENCE

DATE: 26/11/2020

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

- a) State three activities associated with human thinking that can be implemented in AI systems. (3 marks)
- b) Discuss four applications of Artificial Intelligence in smart phones: (4 marks)
- c) State two examples of agents that can be used in intelligent systems (2 marks)
- d) An Expert System has the following facts and rules

RULES

R1: IF one has at least 1 million shillings to invest AND has basic knowledge of running businesses THEN he should invest in securities.

R2: IF the persons annual income is 50 million AND has basic knowledge of running businesses THEN he should invest in stocks.

R3: IF a person is younger than 30 but older than 22 THEN he should invest in stocks.

R4: IF a person is younger than 30 but older than 22 THEN he has basic knowledge of running businesses.

R5: IF a person is wants to invest in stocks THEN he should invest KenGen shares.

FACTS:

F1: Jack has at least 1 million shillings to invest.

F2: Jack is 25 years old

Given the goal: Jack should invest in shares:

- i. Use backward chaining to validate the goal. (4 marks)
- ii. Rewrite rules 1 and 2 in predicate logic form (4 marks)
- e) Explain two attributes of an intelligent agent (4 marks)
- f) Giant technology vendors like Microsoft and IBM have greatly contributed to developing AI platforms and applications. Discuss two vendor specific AI applications that are already in use. (5 marks)
- g) AI has been applied in organizations like banks and colleges to solve various problems. Discuss two categories of machine learning problems that have been handled in these organizations. (4 marks)

QUESTION TWO (20 MARKS)

- a) Machine learning is an important component of AI. Explain three types of machine learning that have been implemented. (6 marks)
- b) AI has been widely applied in different fields. Discuss two ways in which AI has been applied in medicine and industry. (4 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. (10 marks)

QUESTION THREE (20 MARKS)

- a) Given the statement below:
Everyone dislikes beaf.
Task:
 - i. Write the statement in predicate logic (3 marks)
 - ii. Re-write the statement below using existential quantifier. (2 marks)
- b) Show the validity of the following statements using truth tables.
 - i). $\neg P \vee Q \Rightarrow R$

- ii). $\neg(P \wedge Q) \vee (P \wedge Q) \wedge R$ (6 marks)
- c) Explain three reasons why production rules can be preferred to propositional logic. (6 marks)
- d) State three types of knowledge that can be represented and used for reasoning in an intelligent system. (3 marks)

QUESTION FOUR (20 MARKS)

- a) John wants to deploy a robot in an industrial environment. Explain four properties of intelligent agent environments he is likely to explore before executing the plan. (8 marks)
- b) One method of making machines intelligent is through training them. Discuss three machine learning algorithms that can be used to train systems. (6 marks)
- c) Natural Language Processing is one of the main areas of artificial intelligence that has been widely explored. Discuss three areas of application related to NLP. (6 marks)

QUESTION FIVE (20 MARKS)

- a) Discuss the following concepts in relation to game playing. (10 marks)
- i. States
 - ii. Operators
 - iii. Initial state
 - iv. Goal state
 - v. Goal test
- b) Jane wants to design a robot that can be used for vacuum tube cleaning namely VACBOT. Describe the robot using the PAGE description technique. (10 marks)