AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

COLLEGE OF ENGINEERING AND APPLIED SCIENCES

NCSC 301: ARTIFICIAL INTELLIGENCE

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER 2025

LECTURER: MR ALLAN C MUZENDA

TIME: 3 HOURS

INSTRUCTIONS

Start **each** question on a new page in your answer booklet

Answer ***any four (4)*** questions

Credit will be awarded for logical, systematic and neat presentations

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Question 1

a. Consider the graph shown in Fig.1 where nodes are labelled alphabetically and edges have associated costs.

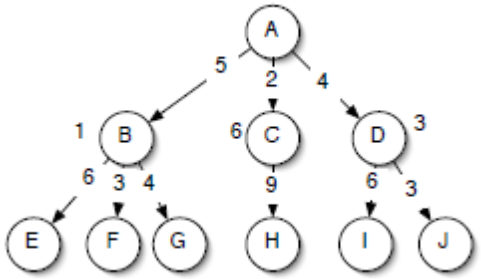

Fig 1: Example of a tree

List the labels in the order they would be visited when performing depth and breath-first search starting from A. Assume that neighbours of the same node are visited in alphabetical order. [10]

b. Explain the difference between forward chaining and backward chaining with the aid of examples. [10]

c. Outline different areas where AI has a great impact. [5]

Question 2

a. Explain the difference between inductive and deductive reasoning. Use examples to illustrate your answer. [6]

b. State any three goals of search methods and provide any four real-world problems where search can be applied to give solutions. [9]

c. Write short notes on handling uncertainty using probabilistic reasoning. [4]

d. Differentiate between deep learning and machine learning. [6]

Question 3

a. Why is knowledge acquisition often referred to as the Expert System `bottleneck'? How might Case-Based Reasoning reduce the problems associated with the knowledge acquisition bottleneck? [8]

b. What kind of mistakes might Expert systems make and why? Why is it easier to correct mistakes in Expert system than in conventional programs? [7]

c. Create a semantic network to describe a car. Your network should include the concepts: car, person, driver, engine, petrol, petrol tank, and road. [10]

Question 4

Basing on the Turing test argument, can we conclude that computers are intelligent? Discuss. [25]

Question 5

a) Using a diagram, explain the main components of an expert system. [10]

b) Using the Prolog programming language, represent the following facts.

i. James and John are male. [2]
ii. Alice and Martha are female. [2]
iii. Cross and Alice are parents of James. [2]

c) Discuss the three major types of machine learning. [9]

Question 6

a) Identify any three challenges that have been encountered in AI research and briefly explain how these challenges can be overcome. [10]

b) Choose a specific business entity and examine its core activities. Explain how AI technologies could be integrated to improve efficiency and ease routine tasks in its day-to-day operations. [15]

END OF EXAMINATION