



UNIVERSITY EXAMINATIONS

SECOND SEMESTER 2023/2024 ACADEMIC YEAR

**THIRD YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF COMPUTER SCIENCE AND BACHELOR
OF SCIENCE IN (ICT)**

BICT 326/COMP 223: ARTIFICIAL INTELLIGENCE

STREAM: R

TIME: 2 HRS

DAY: MONDAY [11.30AM – 1.30 PM]

DATE: 15/04/2024

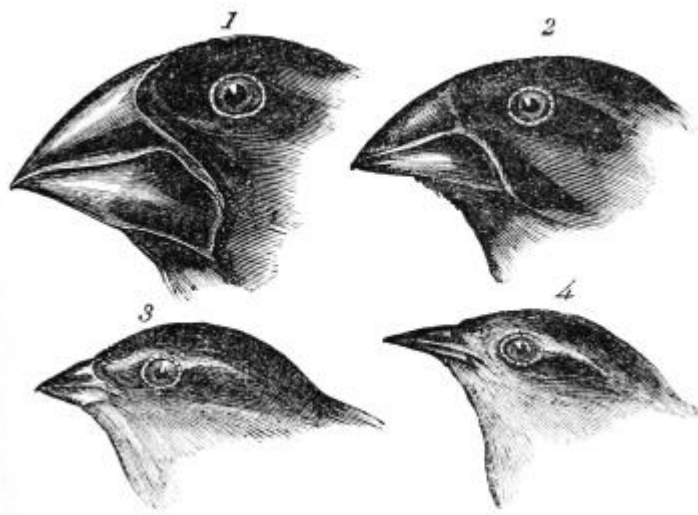
THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE [30 MARKS]

- a) Prof Myles wants to use an artificial neural network (ANN) to automatically determine the species of birds finches of the same family in images using the following measurements: Beak length, beak height, eye diameter, head length, and body length. She has a database of a few hundred labeled images of individuals of these species on which to train his ANN as shown.



- i. Explain whether prof Myles ANN be hidden units or not?. **[4 Marks]**
 - ii. Should the ANN use feedforward connections, recurrent connections, both, or neither?,
Explain your choice **[4 Marks]**
 - iii. Explain the learning mechanism(s) should the ANN use? **[4 Marks]**
- b) Discuss the contributions of AI to the following technologies
- i. Machine learning **[2 Marks]**
 - ii. Cognitive science **[2 Marks]**
 - iii. Robotics **[2 Marks]**
- c) What is depth limited search? **[2 Marks]**

- d) Discuss the components of AI system [6 Marks]
- e) Describe Convolutionary neural network (CNN) [4 Marks]

QUESTION TWO [20 MARKS]

- a) Using examples Differentiate between forward and backward chaining [4 Marks]
- b) Explain **FOUR** application areas of AI [4 Marks]
- c) Explain how the following algorithms operates
 - i. Hill climbing [2 Marks]
 - ii. Bidirectional search [2 Marks]
- d) Define fuzzy logic and Discuss the four components of fuzzy systems in details [8 Marks]

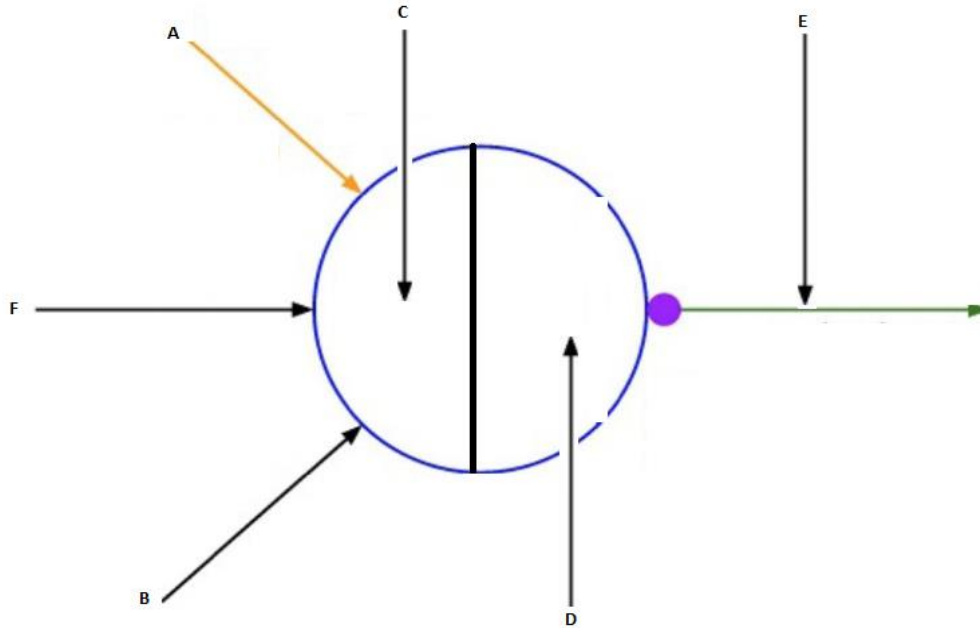
QUESTION THREE [20 MARKS]

- a) AI is developing with such an incredible speed, sometimes it seems magical. There is an opinion among researchers and developers that AI could grow so immensely strong that it would be difficult for humans to control. Briefly explain some these threats citing examples [6 Marks]
- b) Discuss the following as used in classification
 - i. Bayes Theorem [4 Marks]
 - ii. Bayesian belief Network [4 Marks]
 - iii. DAG [2 Marks]
- c) Using a diagram explain the Goal based agent architecture [4 Marks]



QUESTION FOUR [20 MARKS]

- a) List and explain the steps in NLP [10 Marks]
- b) ANN is a computing system made up of a number of simple, highly interconnected processing elements, Discuss the labels A to E as used in a classical neural. [6 Marks]



- c) Describe ethics in AI ? [4 Marks]

QUESTION FIVE [20 MARKS]

- a) Intelligent agents are software entities that carry out some set of operations on behalf of a user or another program with some degree of independence or autonomy,
Explain the types of agents [6 Marks]
- b) Explain the importance of training and testing in machine learning [4 Marks]
- c) What is clustering in AI [2 Marks]
- d) Differentiate between informed and uninformed search. [4 Marks]
- e) List the criteria of evaluating a search. [4 Marks]