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University Examinations 2023/2024

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF MATHEMATICS AND COMPUTER, BACHELOR OF SCIENCE MATHEMATICS AND BACHELOR OF INFORMATION SCIENCE

THIRD YEAR SECOND SEMESTER BACHELOR OF INFORMATION TECHNOLOGY, BACHELOR OF SCIENCE IN EDUCATION AND BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

SECOND YEAR SECOND SEMESTER BACHELOR OF DATA SCIENCE

CCS 3350/CCS 3303: ARTIFICIAL INTELLIGENCE

DATE: APRIL 2024 **TIME: 2 HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE (30 MARKS)

a) Artificial Intelligence is not just a part of computer science even it's so vast and requires lots of other factors which can contribute to it. Describe any four Discipline that contribute to AI and the roles they play (8 Marks)

b) Artificial Intelligence has various applications in today's society. It is becoming essential for today's time because it can solve complex problems with an efficient way. Giving suitable examples identify any five application areas of AI today (5 Marks)

c) Artificial Intelligence can be divided in various types, there are mainly two types of main categorization which are based on capabilities and based on functionally of AI. Discuss the following in types of AI (6 Marks)

i) Reactive Machines
ii) Limited Memory
iii) Self-Awareness

d) Draw a semantic Network that represent the following facts (5 Marks)

- ✓ Jerry is a mammal
- ✓ Jerry is owned by Priya.
- ✓ Jerry is brown colored.
- ✓ All Mammals are animal.
- ✓ Jerry is a cat.

e) Machine Learning can be mainly divided into three types: Giving suitable examples discuss the following types of machine learning (6 Marks)

i) Supervised Learning: .
ii) Unsupervised Learning
iii) Reinforcement Learning

QUESTION TWO (20 MARKS)

a) An environment is everything in the world which surrounds the agent, but it is not a part of an agent itself. Differentiate the following types of agent Environments (6 Marks)

i) Fully observable vs Partially Observable
ii) Static vs Dynamic
iii) Discrete vs Continuous

b) Identify any four ethical considerations related to the development and deployment of artificial intelligence systems (4 Marks)

c) Discuss any five applications of deep Learning (5 marks)

a) Identify any five knowledge acquisition Method (5 Marks)

QUESTION THREE (20 MARKS)

a) Describe any five features required for a machine to pass the Turing test (5 Marks)

b) Using suitable example describe the following types of search (6 Marks)

i) Breadth-first search

ii) Uniform cost search

iii) Depth-first search

c) Overfitting is one of the main issues in machine learning. Discuss any three Methods to avoid Overfitting in ML: (6 Marks)

d) In the context of AI and machine learning Describe what is meant by stable diffusion and state two applications (3 Marks)

QUESTION FOUR (20 MARKS)

a) Write proposes represented by the following First Order Logic (4 Marks)

b) Using a suitable describe Goal Based Agent (6 Marks)

i) $\forall x\ man(x) \rightarrow drink(x, coffee)$.

ii) $\exists x: boys(x) \wedge intelligent(x)$

iii) $\forall x\ bird(x) \rightarrow fly(x)$.

iv) $Man(x) \rightarrow person(x)$.

c) Identify any five data objects in Prolog (5 Marks)

a) Write a program to put facts indicating that a lion, a tiger and a cow are animals into the database and to record that two of them (lion and tiger) are carnivores (5 Marks)

QUESTION FIVE (20 MARKS)

a) Using a suitable diagram Describe the architecture of a typical rule based expert system. [6 Marks]

b) Using suitable examples describe the following knowledge representation schemes (4 Marks)

i) Frames

ii) Production Rules

c) Differentiate the following types of Knowledge and give appropriate example for each (4 marks)

- Reasoning from analogy
- Cause and Effect

d) Artificial intelligence can be divided into different types on the basis of capabilities and functionalities. Giving any suitable examples discuss the following types of AI **Based on** Capabilities (6 Marks)

i) Weak/Narrow AI

ii) General AI

iii) Strong AI