University of M'sila

Faculty of Mathematics and Computer Science

Department of Computer Science

Course: AI Principles and Applications (AI Master 1st year) **Year: 2025-2026**

Duration: 2 hours

Final Exam

Q1. (4 points, 1 pt for each)

- Define the following concepts: Expert system- AI Boom- PROLOG
  Expert system: is a computer program that is designed to solve complex problems and to provide decision-making ability like a human expert. It performs this by extracting knowledge from its knowledge base using the reasoning and inference rules according to the user queries.
  AI Boom: First conference of the AAAI was held at Stanford. Also, the first expert system came into the commercial market, known as XCON. In addition, the Japanese government allocated $850 million (over $2 billion dollars in today's money) to the Fifth Generation Computer project. Their aim was to create computers that could translate, converse in human language, and express reasoning on a human level.
  PROLOG: Prolog (**Pro**gramming in **Log**ic) is one of the classical programming languages developed in 1970 for AI applications.

- Give examples of the use of AI in Natural Language Processing?
  ChatGPT: an advanced language model developed by OpenAI. It can generate human-like responses and engage in natural language conversations using deep learning.
  Smart Assistants like Amazon's Alexa, Apple's Siri, and Google Assistant employ AI technologies to interpret voice commands, answer questions, and perform tasks.

Q2. (4 points, 1 pt for each)

Select only ONE answer:

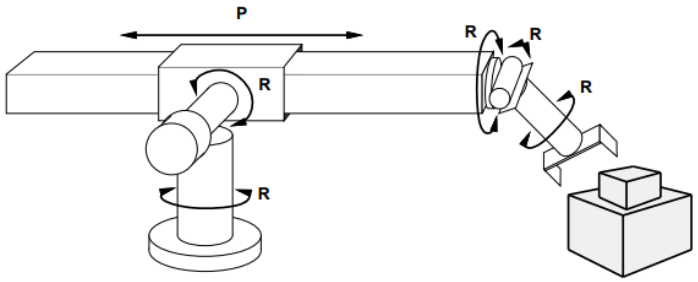
- Which of the following is not the commonly used programming language for Artificial Intelligence?
  - Java
  - Perl
  - PROLOG
  - LISP
- Which of the following can improve the performance of an AI agent?
  - Sensing
  - Observing
  - Learning
  - All of the mentioned
- What is a state space?

- The whole problem space
- Your Definition to a problem
- Problem design and state
- Representing your problem with variable and parameter

- How many types of observing environments are there?
  - 1
  - 2
  - 3
  - 4

Q3. **(4 points, 1 pt for each)**

Robotic assembly refers to using robots to automate the process of assembling components and products.



- Give a problem formulation by clarifying the states, actions, goal test, and path cost?
  States: coordinates of robot joint angles- parts of the object to be assembled
  Actions: continuous motions of robot joints
  Goal test: complete assembly of the object
  Path cost: assembly time

Q4. **(4 points, 1 pt for each)**

- Suppose you have the following database:

```
bigger(elephant, horse).
bigger(horse, donkey).
bigger(donkey, dog).
bigger(donkey, monkey).

is_bigger(X, Y) :- bigger(X, Y).
is_bigger(X, Y) :- bigger(X, Z), is_bigger(Z, Y).
```

- How does Prolog respond to the following queries?
  ?- bigger(donkey, dog).
  Yes

  ?- is_bigger(elephant, monkey).
  Yes

  ?- is_bigger(X, donkey).
  X = horse

?- is_bigger(horse, monkey).
Yes

Q5. (4 points, 0.5 pt for each)

Classify the following terms into atoms, variables, and compound terms:

a_123, _a123, _ , Elephant, monkey, bigger(horse, donkey), 'How are you today?' , f(a(B, _), 3)

Atoms: a_123, monkey, 'How are you today?'

Variables: _a123, _ , Elephant

Compound terms: bigger(horse, donkey), f(a(B, _), 3)