PAPER CODE	EXAMINER	DEPARTMENT	TEL
CPT 302	K.L. Man	CPT	1509

2021/2 SEMESTER 2 – Assessment Task I
BACHELOR DEGREE – Year 4

Multiagent Systems

INSTRUCTIONS TO CANDIDATES

1. The Assessment should be done individually.

2. Total marks available are 100, accounting for 10% of the overall module marks.

3. The number in the column on the right indicates the marks for each question.

4. Answer all questions.

5. Answers should be written in English.

6. Relevant and clear steps should be included in your answers.

7. Your solutions should be submitted electronically through the Learning Mall via the submission link.

8. The naming of Report (in pdf) is as follows:
    CPT302_CW_002_StudentID.pdf (e.g., CPT302_CW_002_1712345.pdf)

Student ID:

Usual Signature

Q1. Consider a 5-by-5 cell Vacuum World as follows:

	a	b	c	d	e
5	*	.		.	H
4		H	.		
3			*		
2	R	.		*	
1		*	.		H

where "R" represents a robot agent, "H" represents a hole and "*" represents dirt.

1. Develop a set of rules (including predicates and actions) that can be used to describe the above 5-by-5 cell Vacuum World.
2. Use these rules to instruct the robot agent to clean up all the dirt starting from (2,a) while avoiding falling into any hole; and then eventually move back to the starting location (2,a).
3. Discuss the set of rules developed by you whether is the optimal.

[20 marks]

Q2. Answer the following questions:

1. Explain what you understand by symbolic, reactive or hybrid (symbolic and reactive) approach to agent implementation.
2. Compare TouringMachines and InteRRap in details (including types of architecture, layers/components in both TouringMachines and InteRRap as well as their functionalities).
3. Describe an application/example that you think the TouringMachines could be fully applied but not for InteRRap. Give reasons why you think so.
4. Also, present an application/example that you think the InteRRap could be fully applied but not for TouringMachines. Give reasons to support your thoughts.

[20 marks]

Q3. A small football team consists of 4 players with the following roles:
1. Goalkeeper - to prevent the opposing team from scoring.
2. Defender - to stop attacks during the game and prevent the opposing team from scoring goals.
3. Midfielder – to provide the link between the attack and the defense.
4. Strike – to score goals.

Design a subsumption architecture for the above-mentioned small football team along with some random players from the opposing team and use inhibition to coordinate the behaviors.

For those who are not familiar with a football game and the roles of different football players, please refer to:
https://www.tutorialspoint.com/football/index.htm

[25 marks]

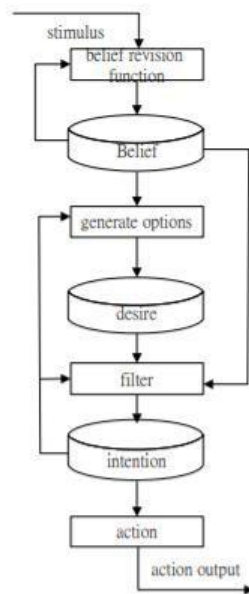Q4. Internet agents are multifunctional and not limited to search capabilities. In this question, you are asked to design X number of Internet agents that can work in cooperation to perform a number of activities. Activities include, but are not limited to, the ability to plan, arrange, buy, sell and negotiate transactions that would normally be carried out by a human   agent   (e.g. provision   services   to   human   user   in http://www.taobao.com).

In your answers, you are required to provide a summary of your agents design. Please note the answer length of this question is limited to four pages and this is to include all figures and tables. In the answers, you are to include the following information:
- Describe precisely the role and functionality of each agent.
- Explain how the agents cooperate together to solve problems that are beyond the capabilities of any individual agent.
- Demonstrate the flexibility of the agents (i.e. they are reactive, proactive and social).

[25 marks]

Q5. Consider the following schematic of a practical reasoning ("BDI") agent:

stimulus

belief revision function

Belief

generate options

desire

filter

intention

action

action output

Given the following appointment requirements:
- Date: June 1, 2022
- Time: 10:00-13:00
- Location: SB007
- SB007 is booked for lectures between 9:45-10:45
- SB007 is closed between 11:45-12:20
- Duration: 45 minutes

Apply the above practical reasoning agent to find out a free time slot for meeting in SB007 which satisfies the given appointment requirements.

[10 marks]

End of the Assessment Paper