University College Dublin
An Coláiste Ollscoile, Baile Átha Cliath

AUTUMN TRIMESTER EXAMINATIONS

ACADEMIC YEAR 2019/2020

COMP 30240 & COMP 41400

Multi-Agent Systems

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Time Allowed: 2 Hours

Instructions for Candidates

Answer any two questions. All questions carry equal marks
Total marks available 100

Student Number

Seat Number

Instructions for Invigilators

Collect both answer sheet and question paper at the end of the exam

Q.1. (a) Explain in detail what is understood by the term *Belief Desire Intention Architecture (BDI)*.
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[10 Marks]

(b) Explain and describe those data structures typically utilised within BDI models to deliver the concepts of *Beliefs, Belief Rules, Events/Perceptions, Commitments* and *Plans*.

Illustrate your answer with diagrams and in particular illustrate the interaction between such data structures in delivering deliberative reasoning.

[20 Marks]

(c) Describe the core constructs provided within AgentSpeak(L).

Within your answer provide illustrative examples for each class of construct.

[20 Marks]

Q.2. (a) Explain the essence of Speech Act Theory and why this has been so influential within the development of Multi-Agent Systems (MAS).

[15 Marks]

(b) Briefly contrast *weak migration* and *strong migration* within agent mobility.

[10 Marks]

(c) Explain in detail three broad approaches in adopting agents to deliver *Intelligent Wireless Sensor Networks (WSNs)*.

[25 Marks]

Q.3. (a) Sandholm identified a desireable set of properties often associated with multi-agent negotiation protocols. Describe these.

[15 Marks]

(b) Explain briefly why auctions often form an important mechanism within multi-agent systems.

[5 Marks]

(c) Identify and briefly explain the dimensions under which auction protocols can be characterised.

[10 Marks]

(d) Explain in detail the *Vickrey Auction*.

Your answer should include pseudo code to illustrate the process.

[15 Marks]

(e) Comment briefly why the Vickrey Auction has received such attention within the multi-agent systems literature.

[5 Marks]

Q.4. (a) Explain the term *Social Robotics*.

[5 Marks]

(b) Explain briefly what is meant by *reactive reasoning* and *deliberative reasoning*, subsequently explain why it is important to accommodate both *reactive* and *deliberative* reasoning within *social robotics*.

Illustrate your answer with examples.

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[10 Marks]

(c) Describe in detail the Social Robotic Architecture, explaining each of the constituent architectural layers together with their interactions.

[20 Marks]

(d) Compare & contrast the Social Robotics Architecture with the *Saphira* robot architecture.

[15 Marks]