



**LIMERICK INSTITUTE  
OF TECHNOLOGY**  
**INSTITIÚID TEICNEOLAÍOCHTA  
LUIMNIGH**

<b>LIMERICK INSTITUTE OF TECHNOLOGY</b>
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**SUMMER EXAMINATIONS 2018/2019**

**MODULE:** GADV08003-Game AI

**PROGRAMME(S):**  
LC\_KGDVM\_KTH Bachelor of Science (Honours) Games Design and Development

**YEAR OF STUDY:** 4

**EXAMINER(S):**  
Eugene Kenny (Internal)  
Mr. Damien Costello (External)

**TIME ALLOWED:** 2 HOURS

**INSTRUCTIONS:** Answer 4 questions. All questions carry equal marks.

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**PLEASE DO NOT TURN OVER THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO.**

The use of programmable or text storing calculators is expressly forbidden.

Please note that where a candidate answers more than the required number of questions, the examiner will mark all questions attempted and then select the highest scoring ones.

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*Requirements for this paper:*

**1. Calculators**

**QUESTION 1** [25 Marks]

- (a) Outline with aid of a diagram the basic structure of a games artificial intelligence engine. [5 marks]
- (b) In *Execution Management*, describe how a frequency based scheduler divides up available time amongst various AI tasks in a game. [10 marks]

What problems occur with this approach?

- (c) Outline three approaches for dividing available time among *Interruptible AI* tasks. [10 marks]

**QUESTION 2** [25 Marks]

- (a) How can movement behaviours be used in *Obstacle Avoidance*? [10 marks]
- (b) Complex movement behaviours can be constructed by combining more basic behaviours. Outline two approaches for doing this. [15 marks]

**QUESTION 3** [25 Marks]

In *Pathfinding*, planning a path is often reduced to a graph search problem by:

1. Constructing a graph representing the planning problem
2. Searching the graph for a (hopefully, close-to-optimal) path

Show how a graph can be constructed by *Approximate Cell Decomposition* and describe any problems with this approach. How can these problems be overcome?

**QUESTION 4** [25 Marks]

- (a) Describe how *Goal-Oriented Planning* is implemented to bring seemingly intelligent behaviours to computer games. [15 marks]
- (b) Basic goal-oriented schemes can yield predictable results. How can uncertainty factors be implemented? [10 marks]

**QUESTION 5** [25 Marks]

- (a) *Action Prediction* attempts to predict the future actions of a player based on past actions. Outline two methods for achieving this. [10 marks]
- (b) Outline three uses for *Tactical Locations* in Strategic AI in games. [15 marks]