On admission to the examination room, you should acquaint yourself with the instructions below. You must listen carefully to all instructions given by the invigilators. You may read the question paper, but must not write anything until the invigilator informs you that you may start the examination.

You will be given five minutes at the end of the examination to complete the front of any answer books used.

May/June 2015 **SE3EC11 2014/15 A 001**

1 Answer Book
Calculators not permitted

UNIVERSITY OF READING

EVOLUTIONARY COMPUTATION (SE3EC11)

One and a half hours

Answer **Question** 1 and any **ONE** out of TWO remaining questions.

EACH Question is 20 marks.

1. (a) Explain what is meant by the evolutionary computing metaphor and how it relates to problem solving. (5 marks)

(b) According to Eiben and Smith, evolutionary algorithms consist of SIX components. What are the SIX components? Explain the role of each briefly. What are the TWO additional features that need to be specified to define a particular evolutionary algorithm? Explain the significance of these TWO features. (8 marks)

(c) Explain how memetic algorithms differ from a standard evolutionary algorithm. (2 marks)

(d) Explain the "No Free Lunch theorem". Explain how this influences how evolutionary algorithms should be designed and used. (5 marks)

2. A university has commissioned you to design an evolutionary algorithm that can be used by the university to create the timetable for all modules at the university. Students and teachers cannot have clashing classes, and rooms can only have one module using it at any given time.

(a) For your design select an appropriate type of evolutionary algorithm and validate your choice. Provide all the basic components of the solution. Explain how you will handle constraints.

(12 marks)

(b) Compare and contrast your solution to other possible solutions using other types of evolutionary algorithm.

(8 marks)

3. A games studio needs an artificial racing driver for their rally car game. It is your job to create a solution.

(a) For your design select an appropriate type of evolutionary algorithm. Describe why it is appropriate. Provide all the basic components of the solution. In the process identify data you need from the car game to develop an appropriate solution.

(12 marks)

(b) Compare and contrast your solution to other possible solutions using other types of evolutionary algorithm.

(8 marks)

(End of Question Paper)