Candidates are admitted to the examination room ten minutes before the start of the examination. On admission to the examination room, you are permitted to acquaint yourself with the instructions below and to read the question paper.

Do 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 2013 **SE3EC11 2012/13 A 001**

1 Answer Book
Any calculator (including programmable calculator) permitted

UNIVERSITY OF READING

EVOLUTIONARY COMPUTATION (SE3EC11)

One and a half hours

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

EACH Question is worth 20 marks.

1. (a) Explain the biological inspiration behind *evolutionary computation* and how it relates to *problem solving.* (5 marks)

   (b) What are the SIX components of an *evolutionary algorithm*? 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 a *memetic algorithm* differs from a standard evolutionary algorithm (EA). (2 marks)

   (d) Define the terms *objective function* and *constraint* in an evolutionary context and hence define FOUR types of EA problem and explain how these affect the construction of an EA. (5 marks)

2. The University of Reading 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)