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 2014 **SE3EC11 2013/14 A 001 & SE3EC11 2012/13 A 201**

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) What is the biological inspiration behind Evolutionary Computation and how is it reflected in the general design of Evolutionary Computation systems?

(5 marks)

(b) According to Eiben and Smith, what are the THREE types of computer problems to which Evolutionary Computation is normally applied? For each type, explain the known and unknown factors. Provide an example to illustrate each of the problem types.

(8 marks)

(c) Explain briefly a co-evolution system. What is the motivation behind co-evolution in computation taken from nature?

(2 marks)

(d) Using pseudo code, write an algorithm that can be used in a simple Evolutionary System.

(5 marks)

2. The supermarket chain Ocset has one shop in each of 150 towns in England. It has 5 lorries that drive to the shops with goods. To run a shop effectively, one lorry must visit the shop once every week. The total distance travelled should be minimised for each week. It is also wasteful if a town is visited by any of the lorries more than once each week, and this should be avoided. Ocset has commissioned you to create an Evolutionary Algorithm design that can solve this problem.

(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 checkers player. 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 discuss how to test the final AI player.

(12 marks)

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

(8 marks)

(End of Question Paper)