Xi'an Jiaotong-Liverpool University 西交利物浦大学

PAPER CODE	EXAMINER	DEPARTMENT	TEL
CSE102		Computer Science and Software Engineering	

2nd SEMESTER 2015/16 EXAMINATIONS (RESIT)

BACHELOR DEGREE – Year 2

ALGORITHMIC FOUNDATIONS AND PROBLEM SOLVING

TIME ALLOWED: 2 Hours

INSTRUCTIONS TO CANDIDATES

READ THE FOLLOWING CAREFULLY:

1. The paper consists of Part A and Part B. Answer all questions in both parts.
2. Each of the questions in Part A comprises 5 statements, for which you should select the one most appropriate answer.
3. Answer all questions in Part A using the Multiple Choice Answer Sheet. Please read the instructions on the Multiple Choice Answer Sheet carefully and use a HB pencil to mark the Multiple Choice Answer Sheet. If you change your mind, be sure to erase the mark you have made. You may then mark the alternative answer.
4. Answer all questions in Part B using the answer booklet.
5. Enter your name and student ID No. on BOTH the Multiple Choice Answer Sheet and the answer booklet.
6. At the end of the examination, be absolutely sure to hand in BOTH the answer booklet AND the Multiple Choice Answer Sheet.
7. All answers must be in English.

THIS PAPER MUST NOT BE REMOVED FROM THE EXAMINATION ROOM

PART B

Question 1 (17 marks)

1A. Briefly describe the idea of the divide-and-conquer technique. **3**

1B. Consider the following problem. Given an array A consisting of n distinct integers A[1], … A[n]. It is known that there is a position p between 1 and n, such that A[1] < A[2]<…< A[p-1] < A[p] and A[p] > A[p+1] > …> A[n] .

1. Design a divide-and-conquer algorithm to find the position p with running time of O(log n) in the worst case. **6**

2. Find the recurrence relation for its time complexity and explain it. **4**

3. Solve the recurrence relation to show that the complexity of your algorithm is O(log n) (for simplicity, you can assume that n = 2k). **4**

Question 2 (8 marks)

Apply the branch-and-bound algorithm to solve the travelling salesman problem for the following graph. **8**