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 2017/18 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. 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.
3. Answer all questions in Part B using the answer booklet.
4. Enter your name and student ID No. on BOTH the Multiple Choice Answer Sheet and the answer booklet.
5. At the end of the examination, be absolutely sure to hand in BOTH the answer booklet AND the Multiple Choice Answer Sheet.
6. All answers must be in English.

THIS PAPER MUST NOT BE REMOVED FROM THE EXAMINATION ROOM

PART B

Question 1 (20 marks)

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

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

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

    b) Set up a recurrence relation for the number of key comparisons made by your algorithm and justify it briefly.   **6**

    c) Solving the recurrence relation to show that the complexity of your algorithm is $O(\log n)$ (for simplicity, you can assume that $n = 2^k$).   **5**

END OF THE PAPER