

PAPER CODE	EXAMINER	DEPARTMENT	TEL
CSE102		Computer Science and Software Engineering	

2nd SEMESTER 2015/16 EXAMINATIONS (FINAL)**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 I (25 marks)

1. Briefly describe the idea of the dynamic programming technique. 4
2. There is a row of n coins whose values are some positive integers c_1, c_2, \dots, c_n , not necessarily distinct. Let $F(n)$ be the maximum amount of money that can be picked up from the row subject to the constraint that no two coins adjacent in the initial row can be picked up.
 - a) Set up a recurrence relation for $F(n)$ that can be used by a dynamic programming algorithm. (hint: to derive a recurrence for $F(n)$, you can partition all the allowed coin selections into two groups: those that include the last coin and those without it.) 6
 - b) For coin row 5, 1, 2, 10, 6, 2 solve the coin row problem using the relation set in a). 3
 - c) Write pseudocode of the dynamic programming algorithm for solving this problem and determine its time complexity. 4
3. **4-SAT Problem:** for a Boolean formula in CNF in which each clause has exactly 4 literals, determine if there is an assignment of Boolean value to its variables so that the formula evaluates to true? (i.e., the formula is satisfiable). Prove **4-SAT Problem** is NP-Complete. 8

END OF THE PAPER