Semester Two of Academic Year (2015---2016) of BDIC

<< Systems Design and Verification >>

Module Code: Comp 3018J

Exam Paper A

Exam Instructions： _Answer any 3 questions_________________

Honesty Pledge：

I have read and clearly understand the Examination Rules of Beijing University of Technology and University College Dublin and am aware of the Punishment for Violating the Rules of Beijing University of Technology and University College Dublin. I hereby promise to abide by the relevant rules and regulations by not giving or receiving any help during the exam. If caught violating the rules, I would accept the punishment thereof.

Pledger： ______   **Class No：** ______

BJUT Student ID： ______   **UCD Student ID**______

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Notes：

The examination paper has 5 questions. Each question is worth 20 marks. You are asked to answer 3 questions. The overall paper is marked out of 60 marks.

Instructions for Candidates

Please attempt any 3 questions on the paper. If you attempt more than 3 questions all will be graded and the 3 best will be counted as your final result.

Instructions for Invigilators

Q1.

Given f[0..N] of Integer, where 0 < N. Please construct an efficient program to fulfil the following specification.

Pre: { f.0 mod 2 = 0 $\wedge$ f.N mod 2 $\neq$ 0 }

Post: { f.i mod 2 = 0 $\wedge$ f.(i+1) mod 2 $\neq$ 0 $\wedge$ 0 $\leq$ i < N } (20 marks).

Obtained score

Q2.

The function f : Natural —> Natural is defined as follows.

* (0) f.0 = 0

* (1) f.1 = 3

* (2) f.(2*n) = f.n + 1 , 0 < n

* (3) f.(2*n+1) = f.n + 2*f.(n+1) + 2 , 0 < n

Given a Natural number N, construct a program to compute f.N. (20 marks).

Obtained score

Q3.

Given f[0..N) of Integer, 0 $\leq$ N, construct a program to compute the maximum segment sum in f. A segment sum is defined as

SS.i.j = $\langle$ + k : i $\leq$ k < j : f.k $\rangle$, 0 $\leq$ i $\leq$ j $\leq$ N (20 marks).

Obtained score

Q4.

Given f[0..N) of Integer, $0 \leq N$, construct a program to compute the length of the longest segment in f which only contains zeros. (20 marks).

Obtained score

Q5.

Given f[0..N) of Integer, $0 \leq N$, construct programs to do the following…

Determine the largest value in f. (6 marks).

Determine the sum of the odd values in f. (7 marks).

Determine whether the value 7 is present in f. (7 marks).

Obtained score