UIT2201: Computer Science and Information Technology Revolution

Spring 2010 – Final Exam (Solution Sketch)

(NOT TO BE GIVEN TO FUTURE UIT2201 STUDENTS)

Question 1: (20 marks)

(a) -- (j) T F T F T T F T T T
Fun Question: (1 bonus mark) _DIY_ (but don't sweat it)

Question 2: (15 marks)

(a) (6 marks)

```
SELECT    Course-ID, Student-ID
FROM      CI, EN
WHERE     (CI.Instructor = "H. T. Gersting") AND
          (CI.Course-ID = EN. Course -ID)
```

G1 ← e-select from CI where (Instructor = "H. T. Gersting");
G2 ← e-join G1 and EN where (G1.Course-ID = EN. Course -ID);
Ans ← e-project Course-ID, Student-ID from G2;

(b) (2 marks)
List all details of the students from faculty "FOE" who are taking the course with Course-ID "UIT2201".

(c) (2 marks) Prof S. Harp is unhappy because the code is very inefficient!
(d) (5 marks) First e-select, e-select, then only e-join; DIY

Question 3: (15 marks)

(a) (3 marks) **AND-gate:** No **OR-gate:** Yes **XOR-gate:** Yes
(b) (4 marks) Truth Table: DIY Z = P*~Q ~~[P*~Q + P*Q]#~~
(c) (2 marks) Read from a Memory Address, Write to a Memory Address;
(d) (3 marks) 21 bits address; Row Selector: 9 bits Col-Selector: 12 bits
(e) (3 marks) Can get * operator from + operators (de Morgan's Law)
(P * Q) = ~ (~(P * Q)) = ~ (~P + ~Q)
Mistake found by KT (Kristen Tang) and DC (Davin Choo)

Question 4: (15 marks)

(a) (2 marks) B = {1, 2, 3} C = {4, 5, 9} sum-diff = 12
(b) (6 marks) Idea: B consists of all the smallest $n/2$ elements; A the rest.
Sort the array A in increasing order;
Then B=A[1 .. $n/2$] (small elements) and C = A[$n/2$+1 .. n] (big elements)
(c) (2 marks) $O(n^2)$ if use Selection Sort; but can be $O(n \lg n)$ with faster sorting alg
(d) (2 marks) B = {1, 2, 9} C = {3, 4, 5} sum-diff = 0
(e) (3 marks) Generate all subsets and find the one that give min sum-diff.
(Up to today, no efficient solution for this problem has been found!)

Question 5: (15 marks) Answer given in Tutorial.

~~~ THE END ~~~