**EE 314**

**BASIC EE II**

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Final Exam Monday, March 15, 2010

THIS IS A CLOSED BOOK EXAM

Students may use 1 page cheat-sheet

Name:

Note:

1) All scratch and problem papers must be turned in.

2) Estimated times required to complete problems are indicated.

|  |  |  |  |
| --- | --- | --- | --- |
| Problem | Weight | Estimated Time | Grade |
| 1 | 9 | 30 |  |
| 2 | 3 | 15 |  |
| 3 | 6 | 30 |  |
| 4 | 4 | 20 |  |
| 5 | 3 | 10 |  |
| Total | 25 | 105 |  |

GOOD LUCK!!!

**Problem 1**

**a)** **Some of the electrical testing was performed at higher-than-normal temperatures or at higher-than-normal voltages. Why would this testing be performed under such stressful conditions even before the chips, boards, or systems have left the manufacturing area?**

**b) How SPM can be used to manipulate single atoms?**

**c) List at least three different applications of robotics**

**Problem 2**

**Consider the diode circuit in figure 1 below. The diodes are both ideal. Determine the voltage at point A, VA.**

**Fig. 1**

**Problem 3**

**In the circuit shown in Fig. 2, assume that both transistors are operating in active region. Find the collector currents, , and the collector to emitter voltages ,  for both transistors if and .**

**Fig. 2**

**Problem 4**

**a) Use Karnaugh map to obtain the minimum SOP (sum of product) form for the following Boolean function:**

**Z = ABC’D’ + AB’C’D’ + ABC’D + AB’C’D + ABCD + A’B’CD’ + A’BCD’**

**b) Then implement the minimum SOP expression using logic gates.**

**Problem 5**

**The input D to a positive-edge triggered flip-flop is shown in figure 3 below.**

**Find the output signal Q**

**Fig. 3**