銘傳大學九十二學年度資訊傳播工程約系碩士班招生考試

第二節

電子學 試題

1. (a) (5%) Please plot the circuit symbols of a diode, a bipolar p-n-p type transistor and an n-channel MOS FET.

   (b) (15%)In Fig. P1, find the output voltage($V_{BE(active)}$=0.7 V,)for input (V_i)levels of 0.2V and 12V, respectively. The silicon h_{FE}=50, transistor in the figure has characteristics as follows:

   $V_{CE(sat)}$=0.2 V, $V_{BE(sat)}$=0.8 V, $V_{BE(active)}$=0.7 V, $V_{BE(active)}$=0.5 V, $V_{BE(cutoff)}$=0.0 V

2. (a) (5%) Please plot the circuit symbols and list truth tables of NAND, NOR, and XOR gate, respectively.
   (b) (15%)Find the simplest two level NAND circuit which will realize the function f(A, B, C, D)= $ABC' + AD' + BC'D + AB'D + ACD$.
3. (a) (5%)Please plot the logic symbols and list the characteristic tables of the JK, T, and D flip-flops, respectively.
   (b) (15%)Design a sequential circuit whose state diagram is shown in Fig. P3. Use T flip-flops and logic gates.
4. (a) (5%) Please list characteristics of an ideal OP amplifier.

   (b) (15%) Please derive an expression for output voltage V_0 of the circuit shown in Fig. P4. Assume the OP AMP in the figure is ideal.
5. (a) (10%)Explain the early effect (base-width modulation). Explain qualitatively the three consequences of this effect.
   (b) Describe the Hall effect. What properties of a semiconductor are determined from a Hall effect experiment?

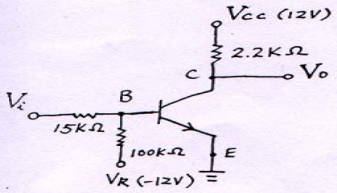

Fig. P1

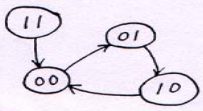

Fig. P3

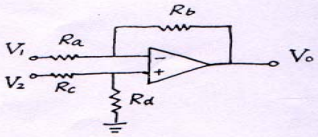

Fig. P4

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