

**COE/EE 243**

**Sample Exam #3**

**Original Date: 10/12/98**

Show your work. Do **NOT** use a calculator!

1. (6 pts) Short answer (3 points each)

(a) When designing for a PLA, one is often required to find multiple sum-or-products expressions for each output. Why is this so?

(b) However, when designing for a PAL, one is only required to find the minimal sum-of-products expressions for each output. Why is this so?

2. (6 pts) Realize the three output function shown below using a 3-to-8 decoder and the appropriate logic gates.

$$f_1(a,b,c) = ab + b'c$$

$$f_2(a,b,c) = (a + b' + c)(a' + b)$$

3. (6 pts) Use a PLA to realize a 4-to-1 multiplexer.

4. (6 pts) Implement  $f(A, B, C, D) = AC'D' + B'D$  using a 4-to-1 multiplexer. Choose the appropriate control inputs.

5. (8 pts) (a) Simplify the following multiple output function for implementation with a PAL, and (b) implement it using the AND-OR based PAL shown below.

$$F1(A, B, C, D) = \sum_m(0, 2, 7, 10) + \sum_d(12, 15)$$

$$F2(A, B, C, D) = \sum_m(2, 4, 5) + \sum_d(6, 7, 8, 10)$$

