

2-2

$$(a) xy + xy' = x(y + y') = x$$

$$(b) (x+y)(x+y') = x + yy' = x$$

$$(c) xy_3 + x'y + xy_3' = xy(z+z') + x'y = xy + x'y = y(x+x') = y$$

$$(d) (A+B)'(A'+B')' = A'B'(AB) = 0$$

2-5

$$F = x + yz \quad F' = (x + yz)' = x'(y' + z')$$

$$F \cdot F' = (x + yz)(x'y' + x'z') = xx'y' + yz x'y' + xx'z' + yz'z' = 0$$

$$F + F' = (x + yz) + (x + yz)' = A + A' = 1 \quad (A = x + yz)$$

2-9

$$A = 10101101$$

$$B = 10001110$$

$$(a) \text{ AND } = 10001100$$

$$(b) \text{ OR } = 10101111$$

$$(c) \text{ XOR } = 00100011$$

$$(d) \text{ NOT } A = 01010010$$

$$(e) \text{ NOT } B = 01110001$$

0  
2-12

$$T_1 = A'B'C' + A'B'C + A'BC' = A'B'(C'+C) + A'C'(B'+B) \\ = A'B' + A'C' = A'(B'+C')$$

$$T_2 = T_1' = A'BC + AB'C' + AB'C + ABC' + ABC \\ = BC(A'+A) + AB'(C'+C) + AB(C'+C) \\ = BC + AB' + AB \\ = BC + A(B'+B) \\ = A + BC$$

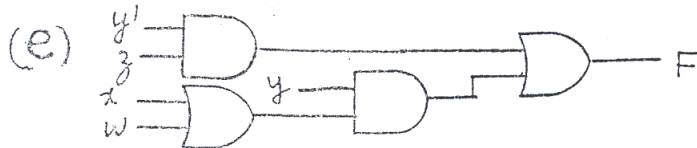
2-15

(a)  $F(w, x, y, z) = \Sigma(1, 5, 6, 7, 9, 10, 11, 13, 14, 15)$

(b)  $F = xy'z + x'y'z + w'xy + wx'y + wxy$   
5 3-input AND gates; 1 5-input OR gate.

(c)  $F = y'z(x+x') + xy(w'+w) + wy(x'+x) \\ = y'z + xy + wy = y'z + y(x+w)$

(d)  $F(w, x, y, z) = \Sigma(1, 5, 6, 7, 9, 10, 11, 13, 14, 15)$



2-17

(a)  $F'(A, B, C, D) = \Sigma(1, 3, 4, 5, 7, 8, 9, 10, 12, 15)$

(b)  $F'(x, y, z) = \Sigma(0, 3, 6, 7)$