SPRING MID-SEM EXAM SOLUTION

DIGITAL ELECTRONICS

EC - 2011

1) a) P → 11101101

Q → 11100110

00000111 (1)

b) Explanation (1)

c) $f = (A+B+C)(\overline{D+E}) + (A+B+C)(D+E)$

$= (A+B+C)[(\overline{D+E}) + (D+E)]$ (0.5)

$= A+B+C$ (0.5)

d) Even

$c_1 = 1$

$c_2 = 1$

$c_3 = 0$

Hamming no $= (011)_2 = 3$ (0.5)

Correct code = 1100110 (0.5)

OR

Odd

$c_1 = 0$

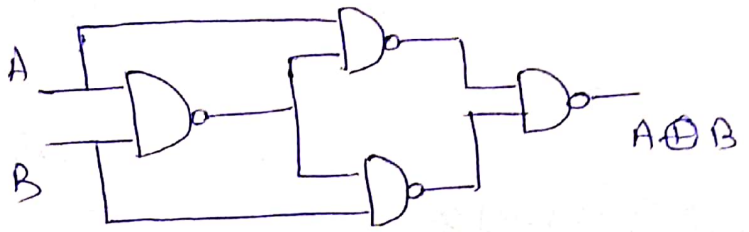
$c_2 = 0$

$c_3 = 1$

Hamming no $= (100)_2 = 4$

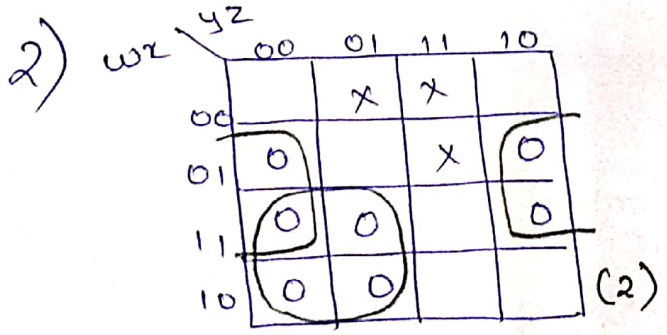
Correct code = 1111110

e)

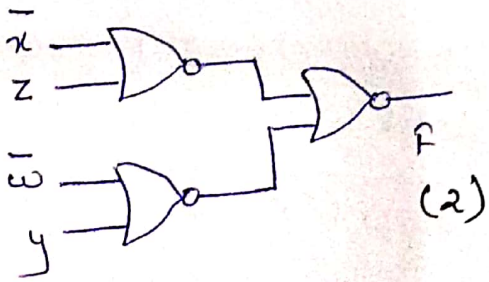


(1)

2)



(2)



(2)

$f = (\bar{x}+z)(\bar{w}+y)$ (1)

3) a) $S_1 = A \oplus B$, $C_1 = AB$ (1)

$S = (A \oplus B) \oplus AB = (A \oplus B)\overline{AB} + (\overline{A \oplus B}) \cdot AB$

$= A\bar{B} + \bar{A}B + AB = A+B$ (1)

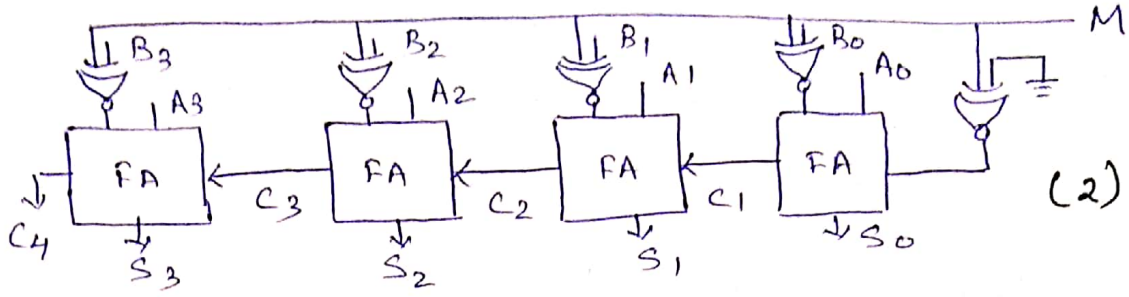
$C = (A \oplus B) \cdot AB = (\bar{A}B + A\bar{B}) \cdot AB$

$= 0$ (1)

b) $AB + \bar{A}C = AB + \bar{A}C + BC$ (1)

Proof (1)

4) a)



(2)

M = 0 → Subtraction
M = 1 → Addⁿ

& Explanation - (1)

b) Advantage of Look-Ahead Carry (1)

$C_1 = G_0 + P_0 C_0$

$C_2 = G_1 + P_1 G_0 + P_1 P_0 C_0$ (1)

$C_3 = G_2 + P_2 G_1 + P_2 P_1 G_0 + P_2 P_1 P_0 C_0$

$C_4 = G_3 + P_3 G_2 + P_3 P_2 G_1 + P_3 P_2 P_1 G_0 + P_3 P_2 P_1 P_0 C_0$

5) a)

D_1	D_0	D_3	D_2	A	B	V
0	0	0	0	x	x	0
1	0	0	0	0	1	1
x	1	0	0	0	0	1
x	x	1	0	1	1	1
x	x	x	1	1	0	1

—(1)

$A = D_2 + D_3$

$B = D_3 \bar{D}_2 + \bar{D}_0 \bar{D}_2$ —(1)

Diagram —(1)

b)

1000 0101 1000
- 0111 0100 1001
0001 0000 1111 —(1)
- 0110
0001 0000 1001 —(1)

— x —