

DEC TUT 6.

Camlin Page
Date / /

Q1. Gray code. \rightarrow if range 5-12. $ABCD \leftarrow IP$

$$f(A, B, C, D) = ?$$

| | A | B | C | D | Y | CD | AB | OD | 01 | 11 | 10 |
|----|-----|------|------|------|----|--------|-----------|--------|----|-----|----|
| 10 | 0 | 0 | 0 | 0 | 0 | 00 | 00 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 1 | 0 | 01 | 01 | 1 | 1 | 1 | 0 |
| | 0 | 0 | 1 | 1 | 2 | 01 | 01 | 1 | 1 | 1 | 1 |
| | 0 | 0 | 1 | 0 | 3 | 02 | 02 | 0 | 0 | 0 | 1 |
| | 0 | 1 | 1 | 0 | 4 | 0 | 00 | 0 | 0 | 0 | 0 |
| | 0 | 1 | 1 | 1 | 5 | 1 | | | | | |
| | 0 | 1 | 0 | 1 | 6 | 1 | | | | | |
| | 0 | 1 | 0 | 0 | 7 | 1 | | | | | |
| 15 | 1 | 1 | 0 | 0 | 8 | 110101 | abundance | (N, F) | A | (d) | |
| | 1 | 1 | 0 | 1 | 9 | 1 | | | | | |
| | 1 | 1 | 1 | 1 | 10 | 1 | | | | | |
| | 1 | 1 | 1 | 0 | 11 | 1 | | | | | |
| | 1 | 1 | 0 | 0 | 12 | 1 | | | | | |
| 20 | 1 | 0 | 1 | 0 | 13 | | | | | | |
| | 1 | 0 | 1 | 1 | 14 | | | | | | |
| | 1 | 0 | 0 | 1 | 15 | | | | | | |
| | 1 | 0 | 0 | 0 | | | | | | | |
| 25 | bbo | 1011 | 1011 | 1011 | | | | | | | |

$$\underline{B'C' + BD + A'CD'}$$

S = binary state diagram

S = sequential logic

101111 possible binary

A → NC → 1 → S

E → N → 1 → S

F → E

Q 2 (a). even parity checker

(i) Data 1110101 parity 1

1 5

(odd + 1) ✓ even.

(ii) Data 1001000 parity 1

2 5
(even + 1) ✗ error

(iii) Data 1110010 parity 0.

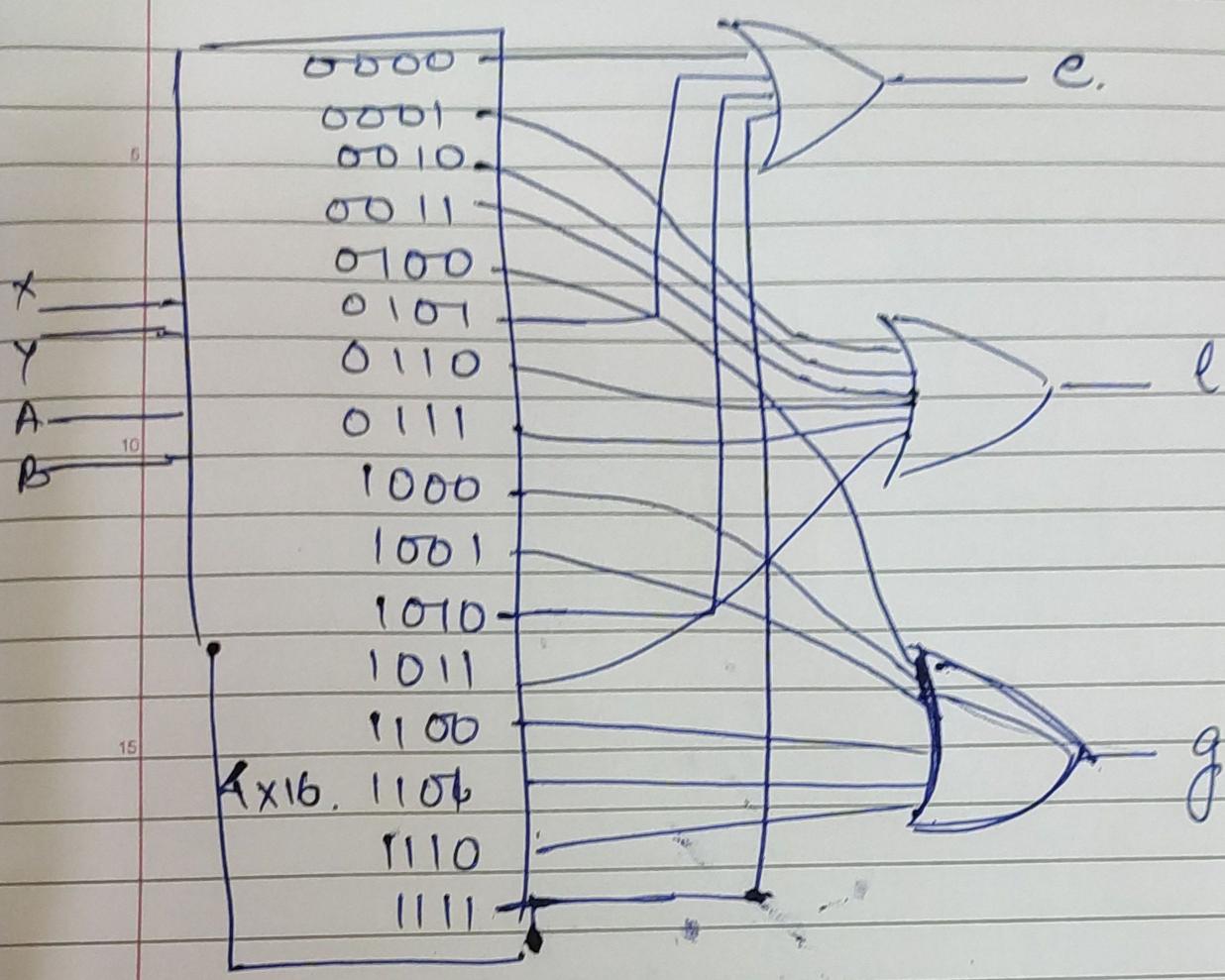
(even + 0) ✓ even.

| Q2. | X | Y | A | B | F |
|-----|----|----|---|---|---|
| (b) | 00 | 00 | e | | |
| | 00 | 01 | f | | |
| | 00 | 10 | f | | |
| | 00 | 11 | f | | |

| | X | Y | A | B | F |
|--|----|----|---|---|---|
| | 01 | 00 | g | | |
| | 01 | 01 | e | | |
| | 01 | 10 | e | | |
| | 01 | 11 | f | | |

| $X\bar{Y}$ | $\bar{A}B$ | F |
|------------|------------|-----|
| 10 | 00 | g |
| 00 | 01 | g |
| 10 | 10 | g |
| 10 | 11 | l |

| $X\bar{Y}$ | $\bar{A}B$ | F |
|------------|------------|-----|
| 11 | 00 | g |
| 11 | 01 | g |
| 11 | 10 | g |
| 11 | 11 | e |



Q3. (a) 0000000 000
 00001111
 01010101
 10101010
 11110000

} what max. no. of bit errors.

Ans. 3.

Hamming error X detected.

hamming dist. \rightarrow 01010101
 max 10101010 \rightarrow 8 = 2^{t+1}
 $t=3.5$
 detection error

Q3.

(b) A(7,4). hamming code 1011011

correct code word = ?

transmitted message = ?

Received message 1101101

$$2^k - 1 \geq m + k$$

$$2^3 - 1 > 4 + 3$$

$$7 \geq 7$$

$C_1 \rightarrow 1011001$ odd
 $C_2 \rightarrow 1001001$ even
 $C_4 \rightarrow 1101001$ odd

$$\text{bit error} = 1 + 4 = 5$$

correct data = 1001011.