Chapter 11

CODES, CONVERTERS, COMPARATORS, AND LOGIC OPERATION PROCESSING CIRCUITS
Lesson 3

Equality and Magnitude Comparators between Two Four-bit Numbers, and Odd Parity and Even Parity Generators
Outline

- Equality comparator
- Magnitude comparator
- Odd Parity generator
- Even parity generator
Digital comparator (DC) difference from a analog Voltage comparator

- (i) DC compares only the logic levels of one number’s binary bits while the later compares two potential differences each with respect to a common ground potential,
- (ii) DC made from the digital logic gates while the later made from an operation amplifier
comparison operation in the computations

- Two binary words of 8 or 16 bits
- Find whether these are equal.
- During executions of while … do... repeat ... until if ... then ... else type of computer statements. It is one of the important logical unit
Equality Comparator

- A comparator, which is not a magnitude comparator, and just an equality comparator
- Has only output terminal for $A = B$ showing a bit (called flag). It will become active (set to 1) if condition is satisfied and show complementary output (reset to 0) if the equality condition is not satisfied
AND-OR Array based Equality Comparator

A0 B0
  |   |
  |   |
A1 B1
  |   |
  |   |
A2 B2
  |   |
  |   |
A3 B3
  |   |
  |   |
A = B
or Zero Flag

Outline

- Equality comparator
- **Magnitude comparator**
- Odd Parity generator
- Even parity generator
Comparison operations in the computations

- Two binary words of 8 or 16 bits
- Find whether these are equal or one greater than other or vice versa.
- During executions of while … do... repeat ... until if ... then ... else type of computer statements. These are the important logical units
Magnitude Comparator

- A comparator is an equality, greater than and less than comparator
- Has three output terminals— for \( A = B \), \( A > B \), \( A < B \) showing a bit (called flag). A flag bit will become active (set to 1) if a condition is satisfied and show complementary output (reset to 0) if a condition is not satisfied
Outline

- Equality comparator
- Magnitude comparator
- **Odd Parity generator**
- Even parity generator
Parity

- Number of 1s are counted and tested whether there are odd number of 1s
- Number of 1s are counted and tested whether there are even number of 1s
Odd Parity generator Application

- msb as error detection bit
- msb of received byte and bit expected as odd parity bit from remaining seven bits tells whether one of the bit got corrupted during transmission due to noise
- Generally used in printers
Odd Parity generator

- XOR

Outline

- Equality comparator
- Magnitude comparator
- Odd Parity generator
- **Even parity generator**
Even Parity generator Application

- msb as error detection bit
- msb of received byte and bit expected as even parity bit from remaining seven bits tells whether one of the bit got corrupted during transmission due to noise
- Generally used in printers
Even Parity generator

- XOR-NOT
Summary
• Equality Comparator all bits of A = all bits of B
• Magnitude comparator all bits of A= all bits of B, Number A > Number B, Number A< Number B
• Odd number of 1s in Input shows Odd parity
• Even number of 1s in Input shows Even parity
End of Lesson 3

Equality and Magnitude Comparators between Two Four-bit Numbers, and Odd Parity and Even Parity Generators
THANK YOU