ECE213: Digital Electronics

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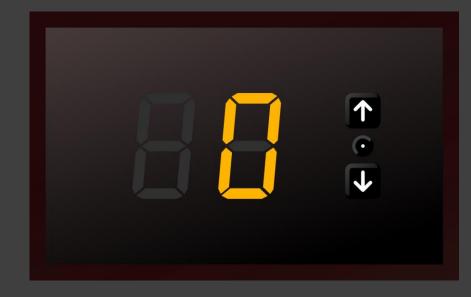ajmer.17381@lpu.co.in

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The Course Contents

Unit V

Sequential Logic Circuits Applications : Registers:
Operation of all basic Shift Registers, Counters:
Design of Asynchronous and Synchronous counters,
Ring counter and Johnson ring counter

- Up
- Down
- Up/Down

- Even
- Odd
- Random or specific (only with synchronous)

Counters ☆ MOD Counter

— A decimal number counter.

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Q. How many no of bits required for desire counter?

A:

4-bits

|1001|

The range of 4-bit 0000

☆ Any FF

0

→ PR (Pre set)

0000 ↓

D   J   Q   1   J   PR   0001

1   K   Q̄   Clock   Q   ⋮

                                 K   Q̄   1001

→ CLR (Clear)   CLR   1010 → Reset or clear command

Both PR, CLR are active low input.

Note: If any of the i/p is low the o/p is high.

Sequential Logic Circuits Applications

Counters → MOD 5 Asyn up counter.

No of FF - 3

Reset
Commd

C	B	A	
0	0	0	— 0
0	0	1	— 1
0	1	0	— 2
0	1	1	— 3
1	0	0	— 4
1	0	1	
1	1	0	
1	1	1	

(1) T_A Q_A (1) T_B Q_B (1) T_C Q_C

Clock

$\bar{Q}_A$ $\bar{Q}_B$ $\bar{Q}_C$

Active
Low

Sequential Logic Circuits Applications

Counters # MOD 10 Asyn Up Counter.

Decal Coun.

DCBA
0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010

Sequential Logic Circuits Applications

Counters # MOD $\boxed{12}$ Asyn Up Counter.

Decd Com.

DCBA

0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
$\boxed{1100}$

Sequential Logic Circuits Applications

Counters # MOD [13] Asyn Up Counter.

Decul Coun.

DCBA
0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101

D C A

Sequential Logic Circuits Applications

Counters   #   MOD 14   Asyn Up counter.
Decl com.

DCBA
0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110

Sequential Logic Circuits Applications

Counters # MOD (10) Asyn Down counter.

Decal Com.

DCBA
0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110
1111

Sequential Logic Circuits Applications

Counters # MOD ⑨ Asyn Down Counter.

Decl Com.

DCBA

0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110
~~1111~~

Sequential Logic Circuits Applications

Counters # MOD ⑭ Asyn Down counter.
Decal Coun.

DCBA
0000
0001
0010
0011
0100
0101
0110
0111
1000
1001
1010
1011
1100
1101
1110
1111