

# CS & IT ENGINEERING



DIGITAL LOGIC

MUX part 2

Lecture No. 2



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## TOPICS TO BE COVERED

01 MULTIPLEXER

02 QUESTION PRACTICE

03 DISCUSSION

✓ Implicants.

— Prime Implicants.

✓ Essential prime implicants.

Selective Prime Implicant → In the answer term which is not

✓ Reduced Prime Implicant → PI which is neither EPI nor SPI.

$$RPI = PI - \{EPI + SPI\}$$

$$\text{Ex} \quad f(A, B, C) = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + AB\bar{C} + ABC \\ = \sum m(0, 1, 3, 6, 7)$$

$$PI = \left\{ \overbrace{\bar{A}\bar{B}, AB}^{\text{EPI}}, \overbrace{\bar{A}C, BC}^{\text{EPI}} \right\}$$

	$\bar{B}C$	$\bar{B}C$	$BC$	$B\bar{C}$
$\bar{A}$	0	1	1	0
A	1	0	0	1

$$\text{① } \overbrace{\bar{A}\bar{B} + AB}^{\text{EPI}} - \overbrace{\bar{A}C}^{\text{SPI}}$$

	$\bar{B}C$	$\bar{B}C$	$BC$	$B\bar{C}$
$\bar{A}$	0	1	1	0
A	1	0	0	1

$$\text{② } \overbrace{\bar{A}\bar{B} + AB + BC}^{\text{EPI}} - \overbrace{\bar{A}C}^{\text{SPI}}$$

Implicants = 5.

Prime Implicants = 4

Essential Prime Implicants = 3

SPI = 1

RPI = 1

Q:

		$\bar{B}C$	$\bar{B}\bar{C}$	$\bar{B}C$	$B\bar{C}$
		00	01	11	10
		$\bar{A}$	0		
		X	X		X
		X	X	X	X

SPL ✓

$$= \bar{A}\bar{B} + B\bar{C} + AC \quad \checkmark$$

$$PL = \{\bar{A}\bar{B}, B\bar{C}, AC, \bar{A}\bar{C}, \bar{B}C, AB\}$$

Implicants = 6

Prime implicants = 6

		$\bar{B}C$	$\bar{B}\bar{C}$	$B\bar{C}$	$B\bar{C}$
		00	01	11	10
		$\bar{A}$	0		
		1	1		1
			1	1	1

$$= \bar{A}\bar{C} + \bar{B}C + AB \quad \checkmark$$



SPI = 3 ✓

RPI = 3

$Q =$ 

		$\bar{B}\bar{C}$	$\bar{B}C$	$BC$	$B\bar{C}$
		00	01	11	10
$\bar{A}$	0	X	X	X	
	1	X	X	X	X

$$= \bar{A}\bar{B} + B\bar{C} + A\bar{C}$$

Implicants = 6

Prime Implicants = 3

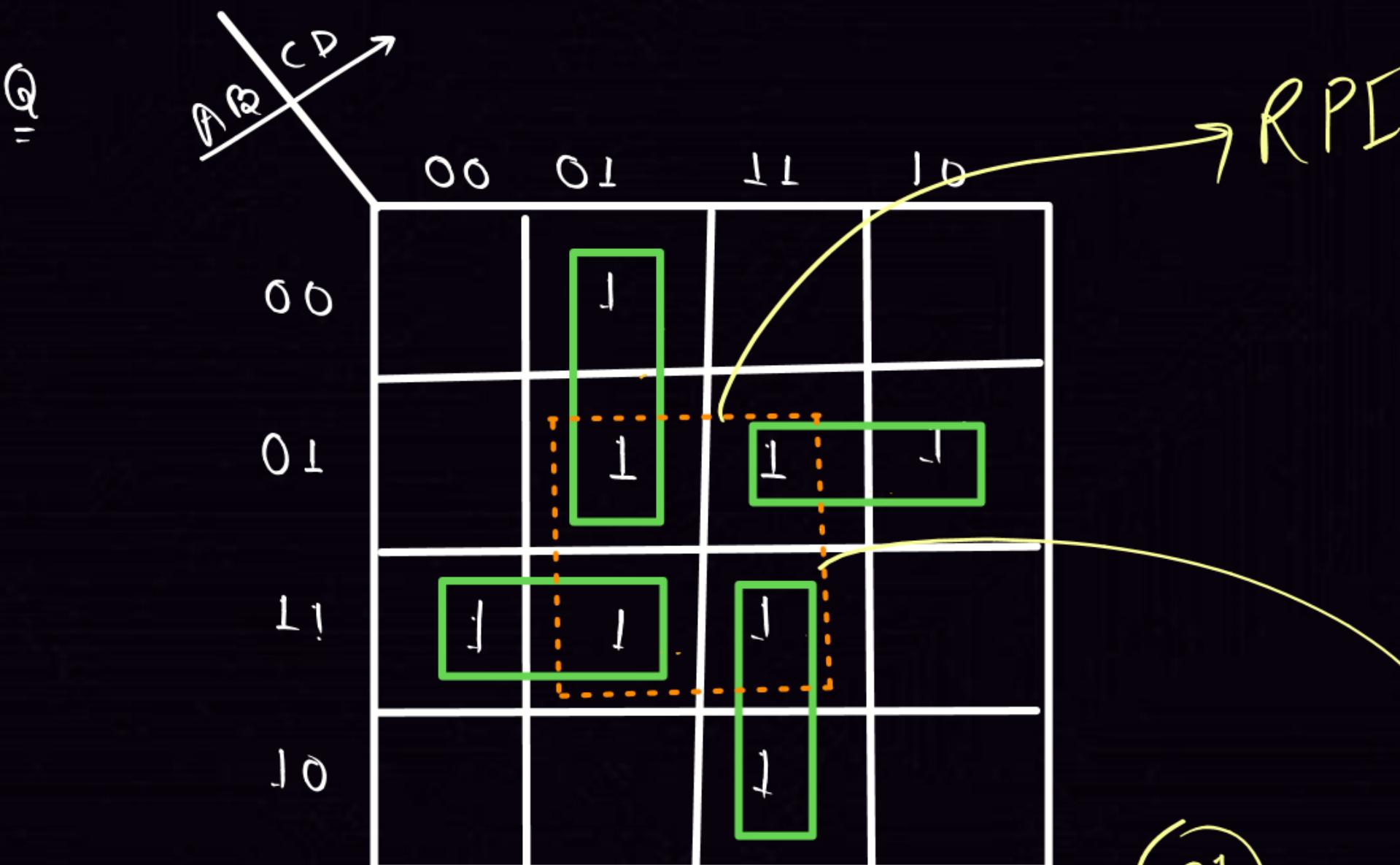
EPI = 

SPI = 3

RPI = 3

		$\bar{B}\bar{C}$	$\bar{B}C$	$BC$	$B\bar{C}$
		00	01	11	10
$\bar{A}$	0	X	X	X	
	1	X	X	X	X

$$= \bar{B}\bar{C} + \bar{A}C + AB$$



Implicants = 8

Prime Implicants  
= 5 ✓

EPI = 4 ✓

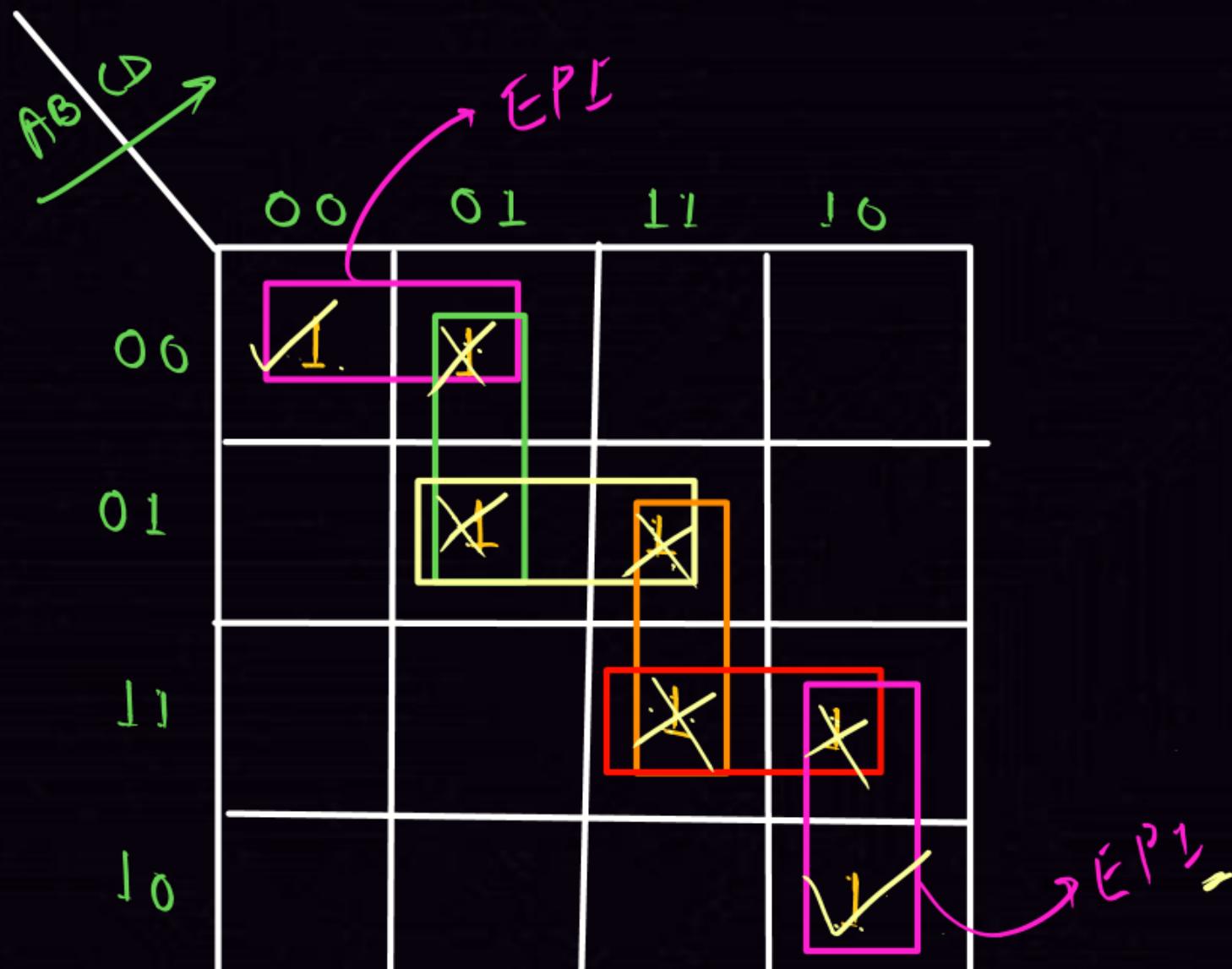
SPI = 0

RPI = 1

Ans

$$\bar{A}\bar{C}D + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ACD$$

SP1

HW

Implicants = 7

Prime Implicants = 6

EPI = 2

SPI

RPI

$A \times BC$

00	01	11	10
0	1	1	
1	1	1	1

when

$$\underline{PI = EPI}$$

$$\begin{cases} SPI \\ RPI \end{cases} = 0$$

$$I = 6$$

$$PI = 3$$

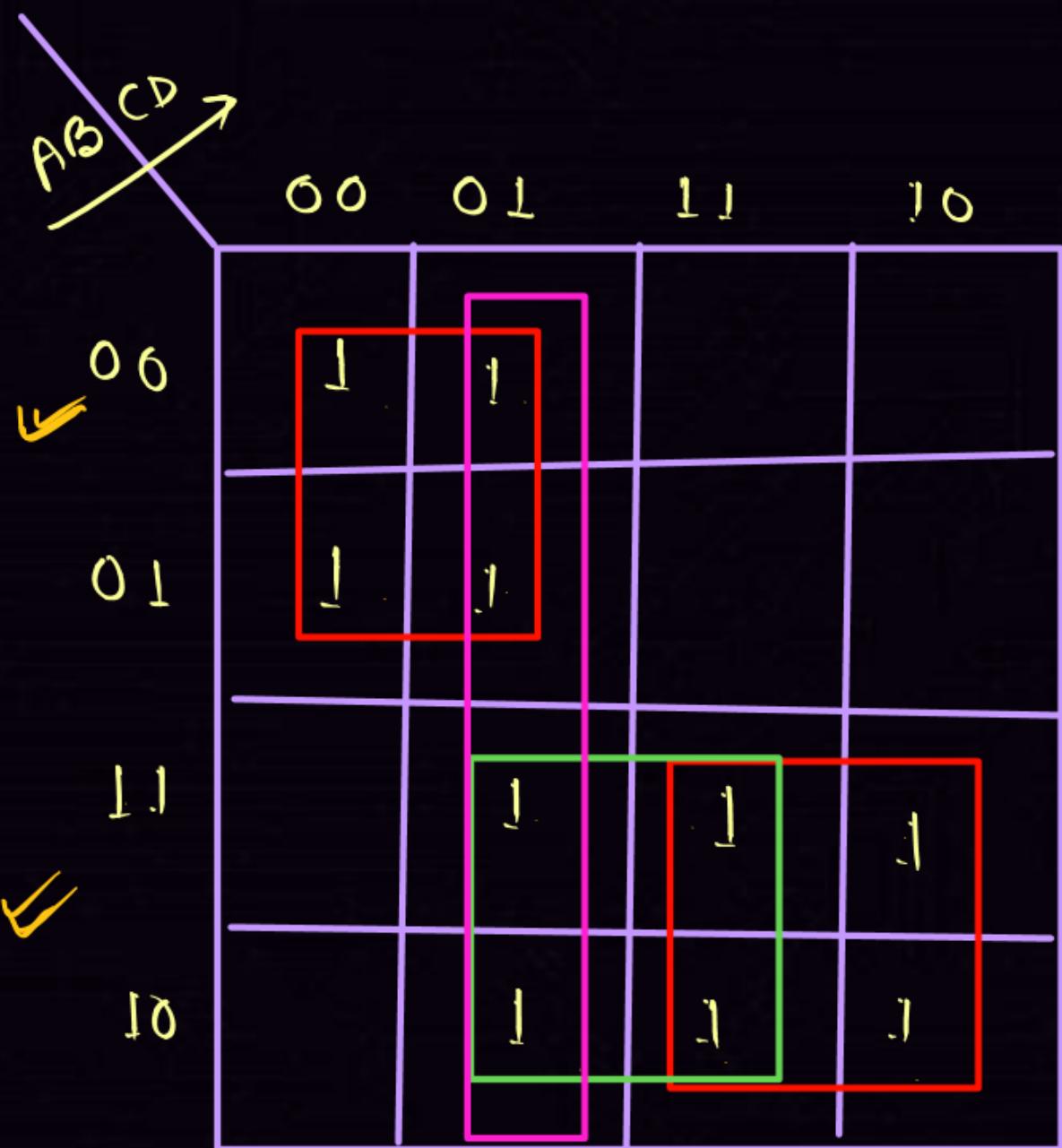
$$EPI = 3$$

$$SPI = 0$$

$$RPI = 0$$

$$\begin{aligned} & \bar{A}\bar{B} + A\bar{B} + C \\ &= \oplus \quad \oplus \quad \oplus \end{aligned}$$

$$\bar{A}\bar{C} + \bar{C}D + AC$$



OR

$$\bar{A}\bar{C} + AD + AC$$

$$\begin{aligned}1 &= 10 \\PL &= 4 \\EPI &= 2 \\SPI &= 1 \\RPL &= 1\end{aligned}$$

$\bar{A}\bar{B}$	$AB$	$\bar{C}D$	$\bar{C}D$	$CD$	$CD$
00	00				
01	01	L	1	J	J
11	AB			1	
10	$A\bar{B}$	1	J	J	J

$$\bar{A}B + \bar{A}\bar{B}D + A\bar{B}C + BC\bar{D}$$

$$\checkmark \overline{AB} + \overline{A}\overline{B}D + \overline{A}\overline{B}C + ACD$$

$$\begin{array}{l} I = 8 \\ PI = 5 \\ EPI = 3 \\ SPI = 1 \\ RPI = 1 \end{array}$$

