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Q.1.

Ans:

	0	1	2						8	9					15		17				21			24
(0,1,8,9)	x	x							x	x														
(1,9,17,25)		x								x							x							
(8,9,24,25)									x	x														x
(0,2)	x		x																					
(17,21)																	x				x			
(25,27)																								
(15,31)															x									
(27,31)																								

	25		27						31		EQUATION
(0,1,8,9)											$\bar{A}\bar{C}\bar{D}$
(1,9,17,25)	x										
(8,9,24,25)	x										$B\bar{C}\bar{D}$
(0,2)											$\bar{A}\bar{B}\bar{C}\bar{E}$
(17,21)											$A\bar{B}\bar{D}E$
(25,27)	x		x								$AB\bar{C}E$
(15,31)									x		$BCDE$
(27,31)			x						x		

∴ The minimised expression is,

$$f = A'B'C'E' + A'C'D' + BC'D' + BCDE + AB'D'E + ABC'E$$

Q.20

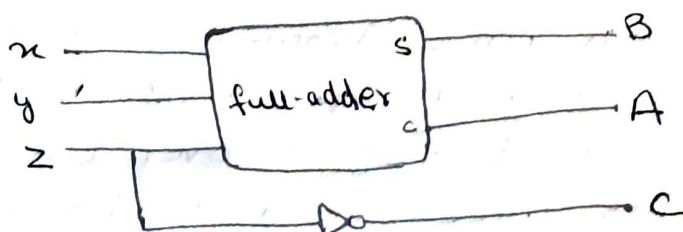| x	y	z	A	B	C
0	0	0	0	0	1
0	0	1	0	1	0
0	1	0	0	1	1
0	1	1	1	0	0
1	0	0	0	1	1
1	0	1	1	0	0
1	1	0	1	0	1
1	1	1	1	1	0

K-map for input:

$$\therefore A = xy + xz + yz$$

K-map for input:

$$\therefore B = x \oplus y \oplus z$$

$$\therefore C = z'$$

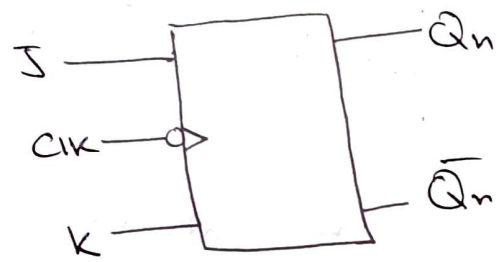The combinational circuit for this would be as follows:

Q.3.

Ans: In JK flipflop, the toggling output or the uncontrolled changing, also called the racing condition is triggered when its output compliments or changes from 1 to 0 and 0 to 1. This only happens when the clock is high.
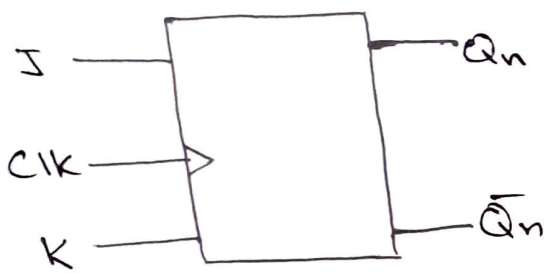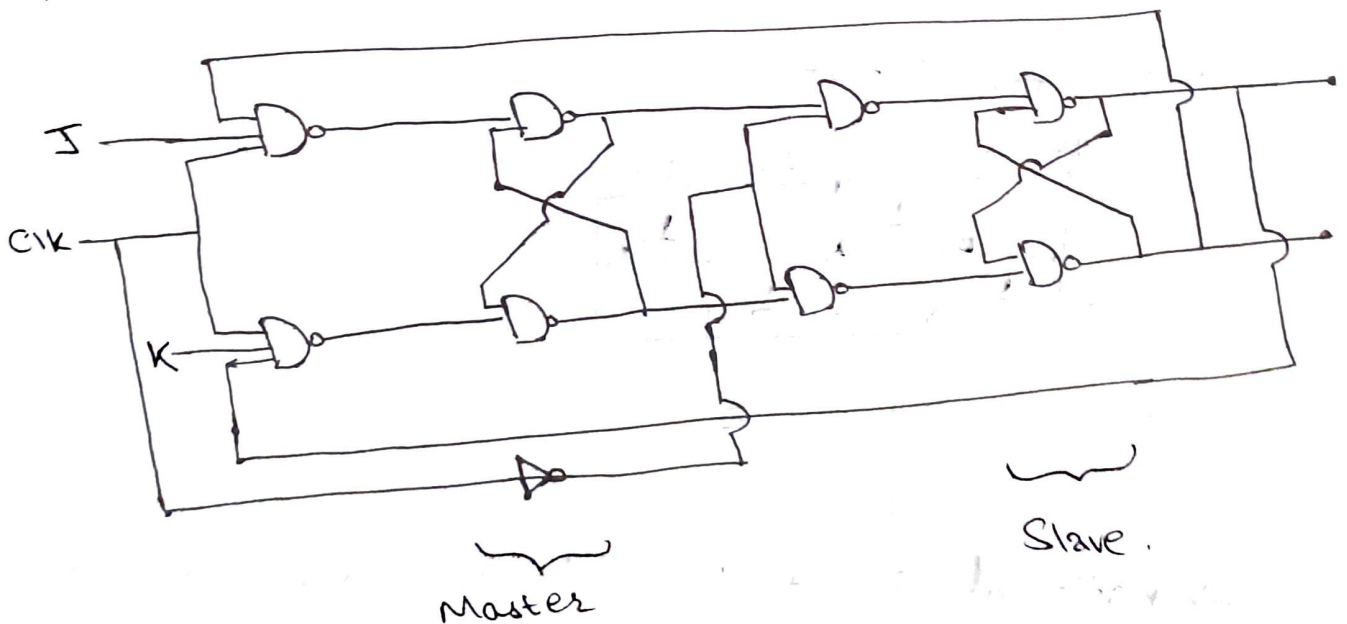
JK level triggered

JK edge triggered.

Master Slave Operation of JK flipflop.

Master

Slave.

Steps ~~Conditions~~ to avoid race around condition:

(i) Using edge triggering instead of level triggering.

(ii) Master Slave Circuit toggles over one clock period, which avoids race around condition.

Q.40

Ans

State - Next State table.

Present State			Next State			Next State Decoder		
Q_2	Q_1	Q_0	Q_2^+	Q_1^+	Q_0^+	T_2	T_1	T_0
0	0	0	0	0	1	0	0	1
0	0	1	0	1	0	0	1	1
0	1	0	0	1	1	0	0	1
0	1	1	1	0	0	1	1	1
1	0	0	1	0	1	0	0	1
1	0	1	1	1	0	0	1	1
1	1	0	0	0	0	1	1	0
1	1	1	×	×	×	×	×	×

$$T_0 = \overline{Q_2} + \overline{Q_0}$$
$$T_1 = Q_1 + Q_0 Q_2$$
$$T_2 = Q_2 Q_1 + Q_0 Q_2$$

for T_0

for T_1

for T_2

CLK

$\overline{Q_2}$ ——————

Q_0 ——————

Q_1 ——————

$\overline{Q_0}$ ——————