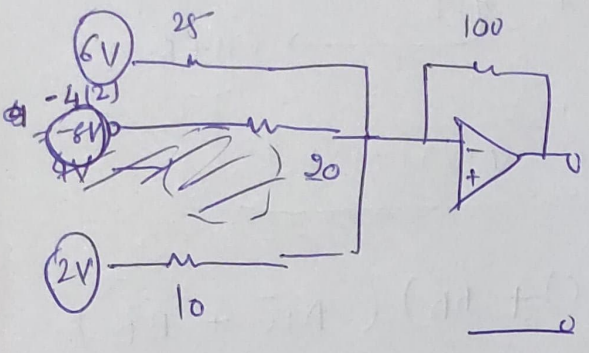
(1)



summer

$$V_o = -\left(\frac{100}{25} \times 6 + \frac{100}{20}(-8) + \frac{100}{10} \times (2)\right)$$

$$= -\left(24 + (-40) + 20\right)$$

$$= \boxed{-(4)\ V}$$

(2) grounded emitter = common emitter

↑ power gain = common emitter

(3) $\alpha = 0.95$

(CB) $\Rightarrow \alpha = \left(\frac{I_C}{I_E}\right)$ ✓

$I_C = \frac{2V}{2k\Omega} = \frac{2}{2\times10^3} = \boxed{0.001\ A}$

$I_E = I_C + I_B$

$I_B = ?$ $\quad \frac{I_C}{\alpha} = I_C + I_B$

$I_B = I_C\left(\frac{1}{\alpha} - 1\right)$

$= (0.001)\left(\frac{1-\alpha}{\alpha}\right)$

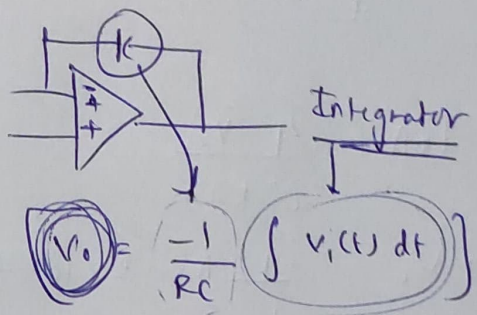
$\frac{0.001 \times 0.05}{0.95}$

$= 5.26 \times 10^{-5}\ A$

$= \left(\frac{5}{95}\right) \times \left(\frac{1}{1000}\right) A$

$= 0.0526 \times (mA)$

(4)



$\frac{dV_o}{dt} = \frac{-1}{RC} V_i(t)$

$= \frac{-1}{(200\times10^3)(0.1)\times10^{-6}} (1.5)$

$= -\frac{1.5}{2\times0.1 \times 10^5 \times 10^{-6}} 10^{-1}$

$= -75 \times 10$

$= \boxed{-75}$

(5)

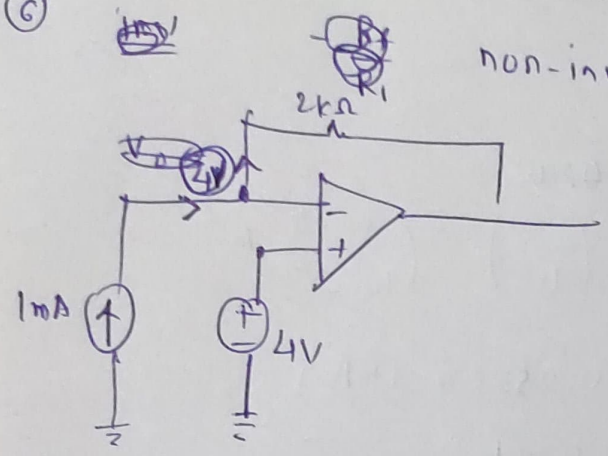
	A	B	C	f
0				
1	0	0	1	1
3	0	1	1	1
4	1	0	0	1
6	1	1	0	1

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

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

$= \bar{A}C + A\bar{C}$ ✓

(6)



$$1mA = \frac{4 - V_o}{(2k\Omega)}$$

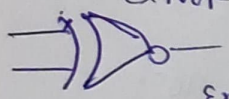
$$4 - V_o = \frac{1}{1000} A \times 2 \times 10^3 \Omega$$

$$4 - V_o = 2$$

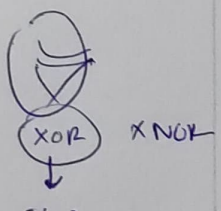
$$V_o = 4 - 2 = \boxed{2V}$$

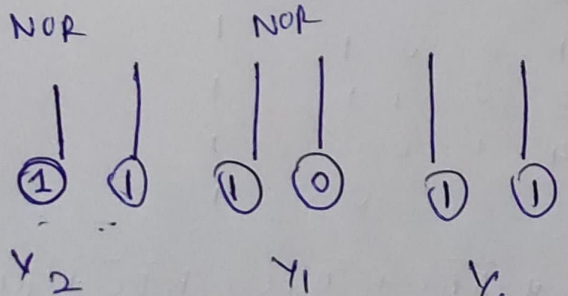
(7) $X_2\ X_1\ X_0 = 101$

EXNOR



X	Y	EXNOR	NOR
0	0	1	0
0	1	0	1
1	0	0	1
1	1	1	0





(8) POS form

$$(A+B+C)(A+\bar{B}+\bar{C}).(A+B+\bar{C})$$

$$\rightarrow (A+\bar{B}+C)$$

$$A + XY = (A+X)(A+Y)$$

$$((A+C) + B\bar{B})(A+\bar{C} + B\bar{B})$$

$$= (A+C)(A+\bar{C})$$

$$= (A + C\bar{C})$$

$$= (A)$$

(9) npn → emitter open

CB → pnp

CE → $I_e = 0.2\ mA$

$$\alpha = \frac{\beta}{1+\beta}$$

(10) $ABCD + A'BC(D+D') + (A+A')B'C'(D+\bar{D})$

1111 → 15

0111 → 7

0110 → 6

$(AD + A\bar{D} + \bar{A}D + \bar{A}\bar{D})\cdot(\bar{B}\bar{C})$

1001 → 9

1000 → 8

0001 → 1

0000 → 0

[0, 1, 6, 7, 8, 9, 15]

(11) non inv

0.2 V

$1 + \frac{240 \times 10^3}{2.4 \times 10^3}$

$1 + \frac{240}{24} \times 10$

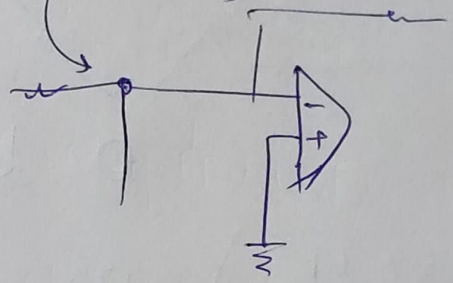
$= 0.2 \times (101)$

$= 20.2\ V > 16V$

non invert → +16V

(12) inverting

$V_s\left(\frac{R_2}{R_1+R_2}\right)$



$V_0 = -\frac{R_f}{R_i}(V_{in})$

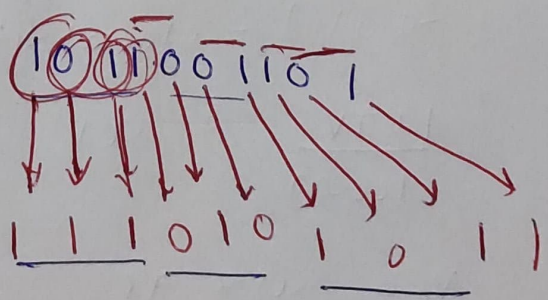
Summer

$V_0 = -\left(\frac{R_f}{R_1} \times V_S + \frac{R_f}{R_2}(0V)\right)$

$= -\left(\frac{R_f}{R_1}(V_s)\right)$

gain exp:-

(13)

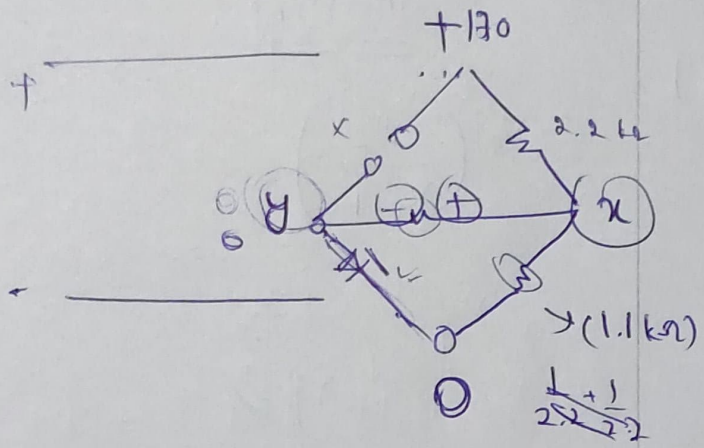


1 1 1 0 1 0 1 0 1 1

1 1 1 0 1 0 1 0 1 1

✓ ✓ ✓

(*) Ideal



$$x = \left(\frac{1.1}{1.1+2.2}\right) \times 170$$

$$= \frac{170}{3} = 56.67\ V$$

$$|x-y| = 56.67$$

* Ge diode (25 ohm)

$$(20 - 0.3V) = (100\Omega) \times (i)$$

$$\frac{19.7V}{(100\Omega)} = (i)$$

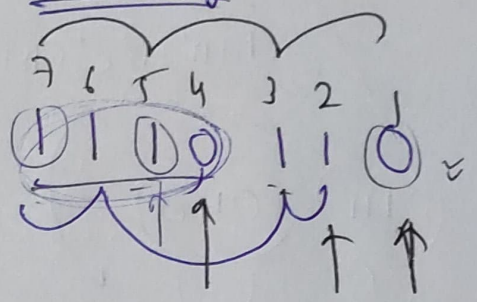
$$V_0 = (i) \times 75$$

$$= 19.7V \times 0.75$$

$$= 14.775$$

*

even parity



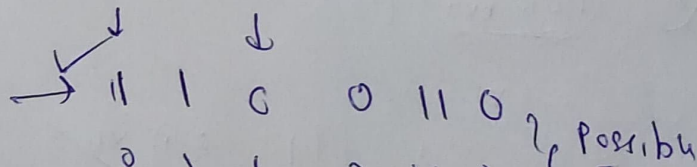
Even

$P_1 \rightarrow$ ~~3~~ ✗ error in (3,5,7)

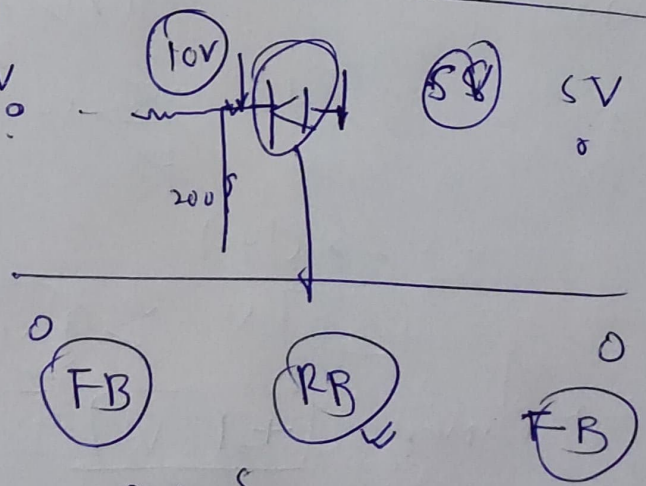
$P_2 \rightarrow 4$ ✓

$P_4 \rightarrow 3 \times$ error in (5,6,7)

$\Rightarrow$ {Error in (5) or (7)}



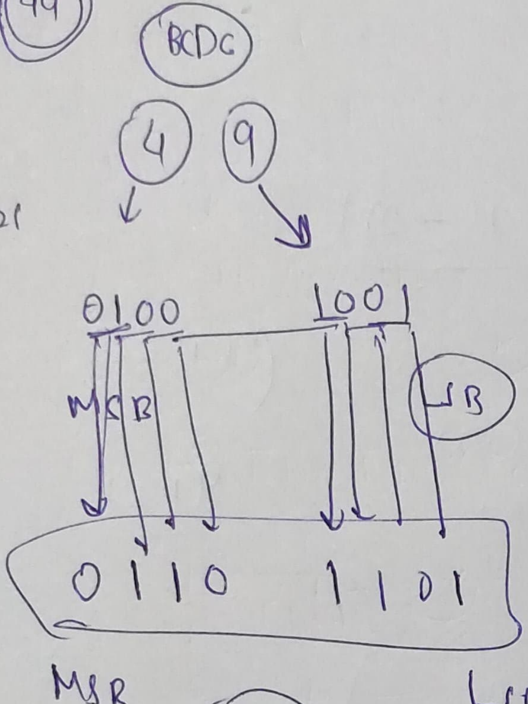
(*)



$\frac{200}{300} \times 15$

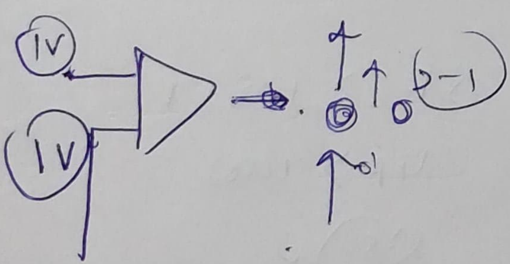
ON OFF ON

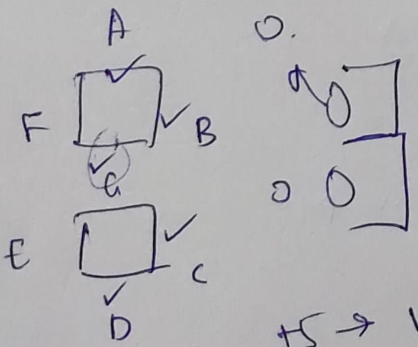
* (49)



(1ig)

(-1)





+5 → V (47) ✓

16 − 0.7 − 0.7 = (14.6V) ← V_0

(-4)

(17)

(I) = $\frac{14.6V}{4.7k\Omega}$

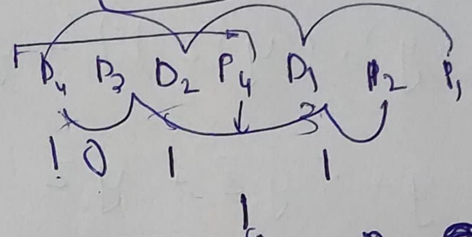
(3.10 mA)

8 4 2 1

1 0 0 0

\+ 0 0 1 1

m = 1011



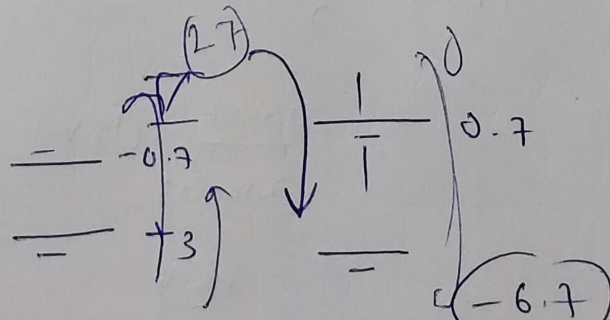
~~1 0 1 0 1 0 1~~

P_1 3 → ✓ 0

P_2 2 → 1

P_3 2 → 1

1011110



(Q) $\overline{[(x+\overline{y}) + \overline{(y+\overline{z})}]} + yz$ Q/ . _ .

⇓

$[(\overline{x+\overline{y}}) \cdot (y+\overline{z})] + yz$

↓

$= ((\overline{x} \cdot y) \cdot (y+\overline{z})) + yz$

$= \overline{x} \cdot y + \overline{x} y \overline{z} + yz$

$= \overline{x} \cdot y(z+\overline{z}) + \overline{x} y \overline{z} +$

↓ $(x+\overline{x}) yz$

011 ⟶ 3

010 ⟶ 2

~~010~~

111 → 7

011 → 3

$V_i)(-2)$

$\left(1+\frac{2}{10}\right)$

$-2(1.2)$

-2.4

$2(1.2)$

$\left(\frac{R_L}{1000+R_L}\right) 50 > \frac{50V}{(5)}$

$5R > 1000 + R$

$4R > 1000$

(250) ✓

AB = BA

Q

$\frac{1600}{(2400)} \times (15V)$

10

$(I^2)(12)$

(3.33)(mA)

6.67 mA

(0 mA)

$VI = 12V \times 3.33$ mA

$\overline{ABC} + A'$,