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Paper: EDC I
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Q1:

The IN 4747 zener diod used
the regulation current in figu 20V

Given Data.

$V_Z = 20V$ $I_Z = 12.5mA$

$I_{ZK} = 0.25mA$ $Z_Z = 22\Omega$

(a) for I_{ZK}

$V_{out} = V_Z - \Delta I_Z - I_Z$

$20V - (12.5mA - 0.25mA)\ 22\Omega$

$20V - 0.267V$

$V_{out} = 19.73V$

P.10

(2)

Calculate the zener diod maximum current the power dissipation is 1W

$$I_{zm} = \frac{P_{D(max)}}{V_Z} = \frac{1W}{20V} = 50mA$$

for I_{zm}

$V_{out} = V_Z + 4I_Z Z_Z$

$= 20V(I_{zm} - I_Z)Z_Z$

$= 20V + (50mA - 12.5mA)22\Omega$

$= 20V(37.5mA)22$

$= 20 + 0.825$

$V_{out} = \boxed{20.825V}$

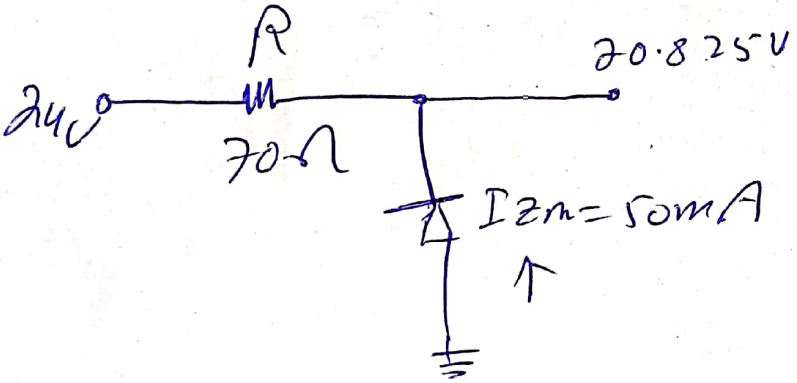
(b) Calculate the value of R for Max Zener current when there is no load as shown in figure.

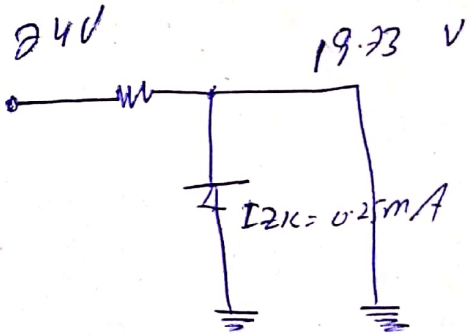
$$R = \frac{V_{in} - V_{out}}{I_{zm}}$$

$$= \frac{24V - 20.825V}{50mA}$$

$$R = 63.5\Omega$$

$R = 70\Omega$ (Nareast largest standerd)





c) for maximum load Resistance (Maximum current) The zero diod current minimum ($I_{zk} = 0.25$)

$$I_T = \frac{V_{in} - V_{out}}{R} = \frac{24 - 19.73V}{70\Omega}$$

$$= 0.061A$$

Question 2 (4)

Soll:

$V_{BE} = 0.7V$

$\Rightarrow I_B = \frac{V_{BB} - V_{BE}}{R_B}$

$= \frac{5V - 0.7V}{3.9K\Omega} = \boxed{1102\mu A}$

$\Rightarrow I_C = \beta_{DC} \cdot I_B \Rightarrow$

$= (150)(1102\mu A) = \boxed{165.3mA}$

$= I_E = I_C + I_B \Rightarrow (165.3\ mA) + (1102\mu A)$

$= 165.3mA + 1102\mu A$

$= 166.4mA$

$\boxed{166.4mA}$ $\boxed{166.4mA}$

Solve for V_{CE} and V_{CS}

$V_{CE} = V_{CC} - I_C R_C = 15V - (165.3mA)(180\Omega)$

$= 15V - 29.7V = \boxed{-14.7V}$

P.T.O

$V_{CB} = V_{CE} - V_{BE} = -14.7V - 0.7$

$= -15.4V$

Since the collector is at a lower voltage than the base, the collector base Junction is forward bias.

Q3:

Ans:

Bipolar Junction Transistor:

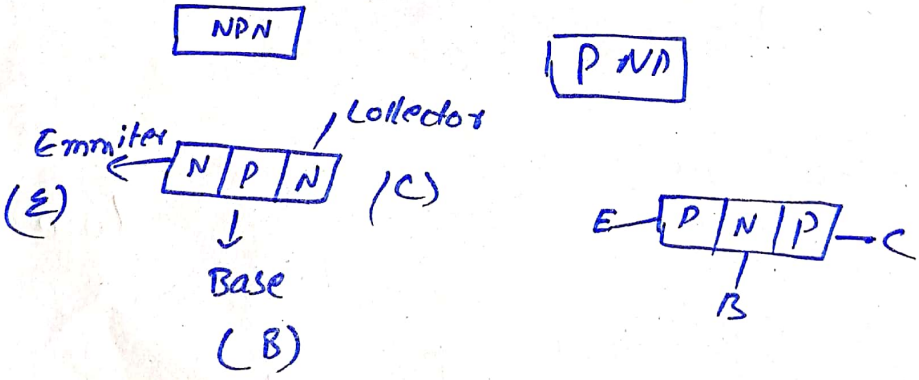
BJT:

Transistoras:

→ Invented in Dec 1947 at bell labs at USA

* BJT is a Three Terminal device and it is used in amplification & weak signal ~~and it is~~ in Switching operation.

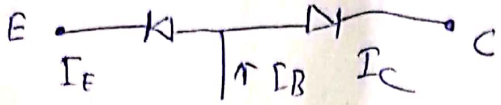
Physical structure:

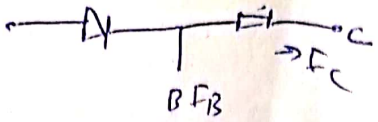


* 2 Junction (N)
* 1 Junction (P)
* J_1 → emitter-base
* J_2 → collector-base
* There is depletion region at J_1

width C > E > B
doping E > C > B

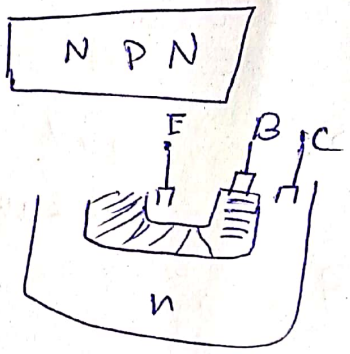
- There is depleation region T_2

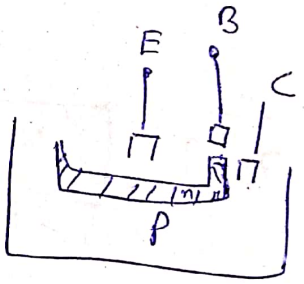




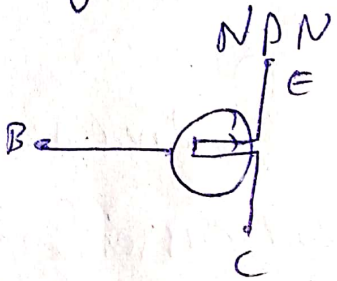
Structure

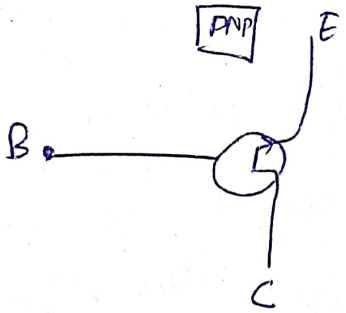
Cross Section view





Symbol

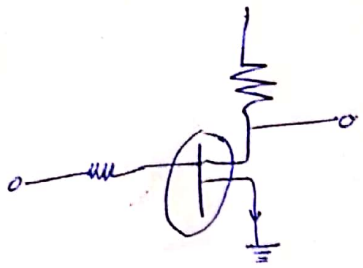




increas of NPN there will more form B→E

96

What is V_{CE} where $V_{in} = 0V$



(a)

$V_{CE} = ?$ $V_{in} = 0V$

When $V_{in} = 0V$ So Transmitter is cutt off mode.

$$V_{CE} = V_{CC} = 10V$$

(b)

$\min I_B = ?$ $\beta_{DC} = 125$.

$$V_{CE(sat)} = 0.4V$$

$$I_{C(sat)} = \frac{V_{CC}}{R_C} = \frac{10V}{1.0k\Omega} = 10mA$$

$$I_{B(min)} = \frac{I_{C(sat)}}{\beta_{DC}} = \frac{10mA}{125}$$

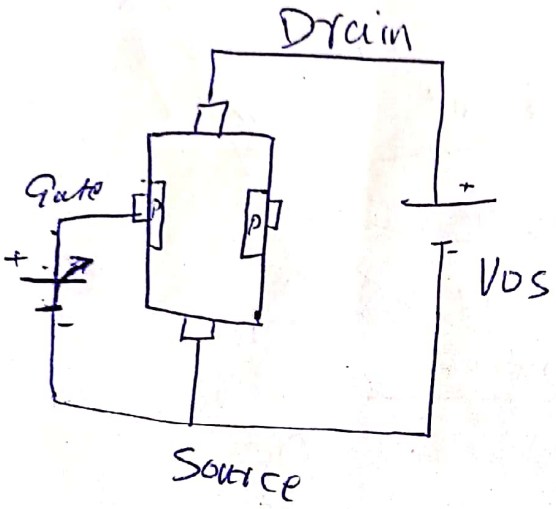
$$I_{B(min)} = 0.08\mu A$$

Q5.

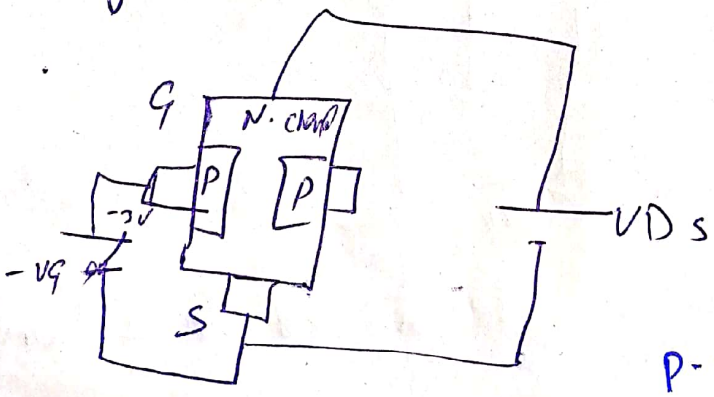
(9)

Ans

JFET is a Type of Junction field effect Transistor which is voltage controlled device as differ from BJT which is Current controlled

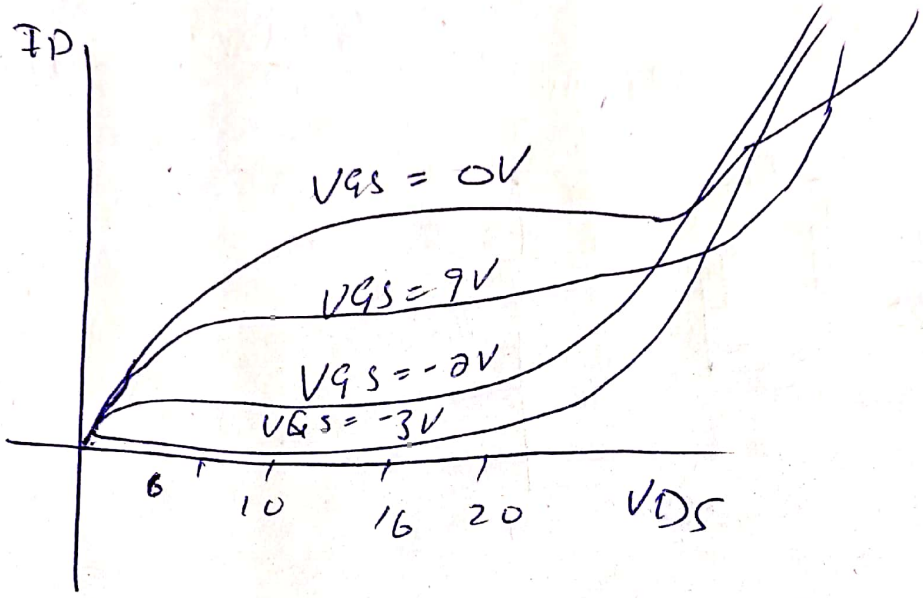


Actually in FET the Drain to source Current is controlled by the width of the channel the electric field produced by the gate to source voltage

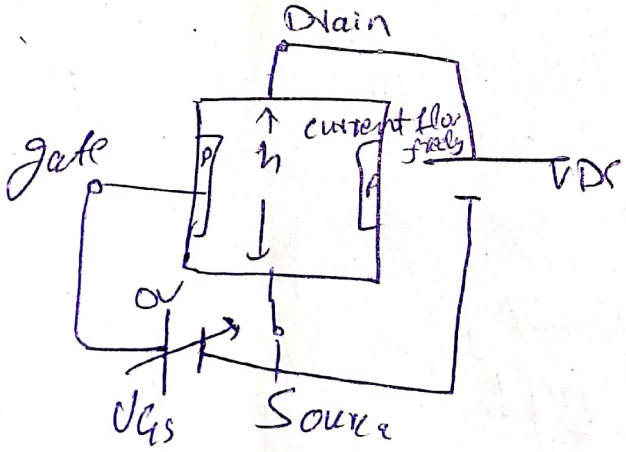


P-T-O

So VGS is more negative than this effect is called Pinch off region no current or less current flows.



so if we see to the graph with the no voltage applied to the gate the current flows



the Chennal are ~~under~~ wider and Drain

(11)

current moves freely

If we ~~Add~~ Move fo decreases

And current cannot move :

Q4:

- Transmiter fully ON
- Transmiter fully OFF
- input and base ateat 0V
- Collector current IC = 0
- VCE = VCC
- BE Junction in R.B
- BC Junction in R.B

- Max or Saturation current IC flows
- BE Junction in F.B
- BC Junction in F.B
- VCE = 0
- BE Junction is less Then 0.7V