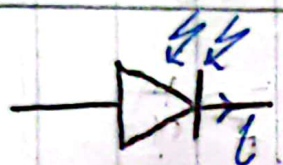
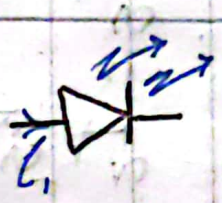
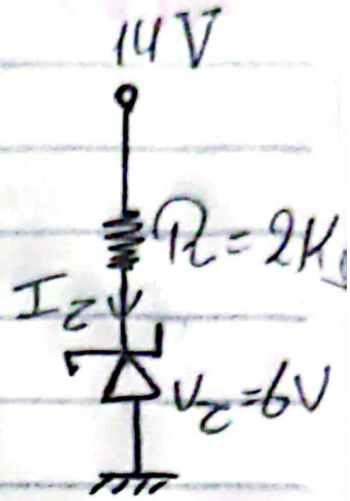
lec(6)

	Photodiode	LED	Schottky	varactor	zener
1) schematic symbal					
2) Function	convert light energy to electic	convert electicenergy To light energy	Fast switch	variable capacitor	It cause a consten voltage
3) Baise	Reverse	Forward	switch back and forth very fast	Reverse Voltage	Reverse Voltage
4) Application	-Solar cell -Smoke detector -remote control -medical devic	-T.V -coulored display -Traffic Signals	-RF mixers -Digital devia -IC's Schottky TTL -Tigger switch "SCR"	Voltage controlled oscilla (VCO)	-Voltage regulato -Protecti circuits

→ Zener diode

$$I_Z = \frac{V - V_Z}{R} = \frac{14-6}{2} = 4\,mA$$



EX:-

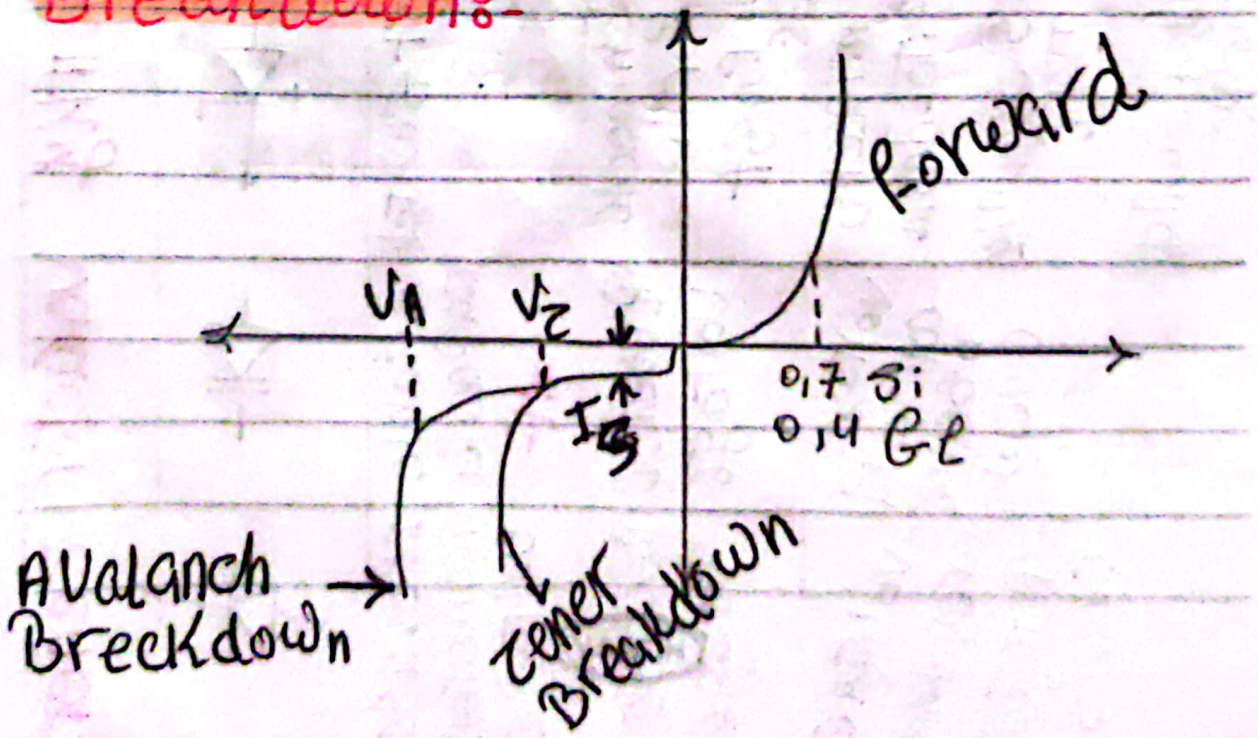
$$\Rightarrow I_\ell = \frac{I_Z}{R_L}$$

$$\Rightarrow I_S = \frac{V - V_Z}{R_S}$$

$$\Rightarrow I_S = I_Z - I_\ell$$

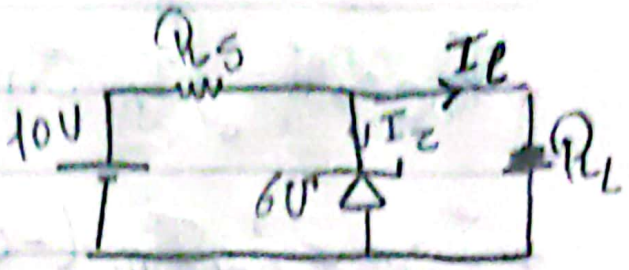
$I_Z \leq I_{Z\,max}$

→ Zener Breakdown & Avalanch Breakdown:-



(2) *

$$I_S = \frac{10-6}{1} = 4\,mA$$



$$I_\ell = \frac{V_z}{R_L} = \frac{6}{4} = 1.5\,mA \qquad R_L = 4K\Omega,\ R_S = 1K\Omega$$

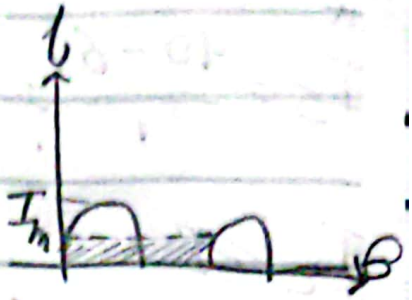
$$I_S = I_z + I_\ell \qquad \therefore I_z = I_S - I_\ell$$

$$I_z = 4 - 1.5 = 2.5\,mA$$ **

	HWR	FWR
I_{DC}	$\frac{I_m}{\pi}$	$\frac{2I_m}{\pi}$
I_{rms}	$\frac{I_m}{2}$	$\frac{I_m}{\sqrt{2}}$
V_{DC}	$\frac{V_m}{\pi}$	$\frac{2V_m}{\pi}$
γ	40,2 %	81.2 %
Ripple Factor	1.21	0,48

$$* \pi I_{DC} \cdot 2\pi = \int_0^{\pi} I_m \sin\theta \, d\theta$$

$$\rightarrow I_{DC} = \frac{1}{2\pi} I_m (-\cos\theta)\Big|_0^{\pi}$$



$$= \frac{1}{2\pi} I_m [1 - (-1)] = \frac{I_m}{\pi}$$

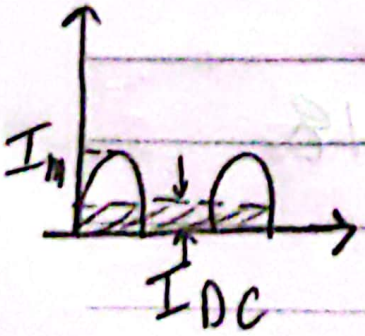
$$I_{rms} = \sqrt{\frac{1}{2\pi} \int_0^{\pi} I^2 \sin^2\theta}$$

$$= \sqrt{\frac{1}{2\pi} I^2 \int_0^{\pi} \frac{1}{2}(1 - \cos(2\theta))}$$

$$= \frac{1}{2} I_m \sqrt{\frac{1}{\pi} \left[\theta - \frac{1}{2}\sin(2\theta)\right]_0^{\pi}}$$

$$= \frac{1}{2} I_m$$

$$\eta = \frac{P_{DC}}{P_{rms}} = \frac{I_{DC}^2 R_L}{I_{rms}^2 R_L} = \frac{I_m^2}{\pi^2} * \frac{4}{I_m^2} = \frac{4}{\pi^2}$$



$$I_{rms}^2 = I_{DC}^2 + i_{ac_{rms}}^2$$

$$i_{ac_{rms}}^2 = I_{rms}^2 - I_{DC}^2 \quad \div I_{DC}^2$$

No:---------- Date:----------

$$\frac{I_{ac_{rms}}}{I_{DC}^2} = \frac{I_{rms}^2}{I_{DC}^2} - 1$$

$$\frac{I_{ac_{rms}}^2}{I_{DC}^2} = \frac{I_{rms}^2}{I_{DC}^2} - 1$$

$$\frac{I_{ac}}{I_{DC}} = \sqrt{\frac{I_m^2}{4} * \frac{\pi^2}{I_m^2} - 1} = \sqrt{\frac{\pi^2}{4} - 1} = 1.21$$