

Shree Datta S. S. S. K. Ltd. Charitable Trust's
SHREE DATTA POLYTECHNIC COLLEGE,
DATTANAGAR.

Examination 20

Supervisor's Sign.	1
Main Answer Book	
Supplements	
Total	

Name of Exam. _____ Date _____

Name of the Candidate (Full) _____

Sem. _____ Course / Code _____ Roll No. _____ Subject _____

Q. No.	1	2	3	4	5	6	7	8	9	Total	Signature of Examiner
Marks											

Begin your answer from here

Question No.

Model Answer of Class Test No.1
Elements of Electronics (172153)

Q.1 Write the formula for capacitive reactance.
State the effect of frequency on the capacitive reactances.

Capacitive Reactance $X_c \rightarrow$

$$X_c = \frac{1}{2\pi f C}$$

$$X_c \propto \frac{1}{f}$$

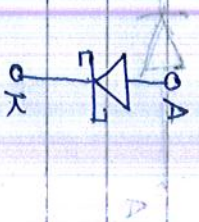
So As the frequency increases Capacitive reactance decreases.
As the frequency decreases Capacitive reactance increases.

22 Draw the symbol and list the applications of PIN diode and Schottky diode.

Symbol \rightarrow



PIN Diode



Schottky diode

Pencil

- * Applications of PN diode -
- ① Used in Amplitude modulator at microwave frequencies beyond 1 kHz.
 - ② It can be used as a dc controlled microwave switch.

* Applications of Schottky diode -

- ① In (SMPS) Switching Mode Power Supplies
- ② Ac to Dc converters
- ③ Radar Systems
- ④ Mixers and detectors in communication equipments.

3) List specifications and applications of linear and non-linear potentiometers.

Specifications -

- ① Ohmic Range \rightarrow 10 Ω to 125 k Ω
- ② Power Rating \rightarrow 100 watt to 200 watt
- ③ Tolerance \rightarrow $\pm 2\%$

Applications -

- ① In Dc Power Supplies
- ② In signal Generators
- ③ In Radio receivers
- ④ In TV receiver
- ⑤ In amplifier circuits
- ⑥ In Public Address Amplifiers (P.A.) Systems

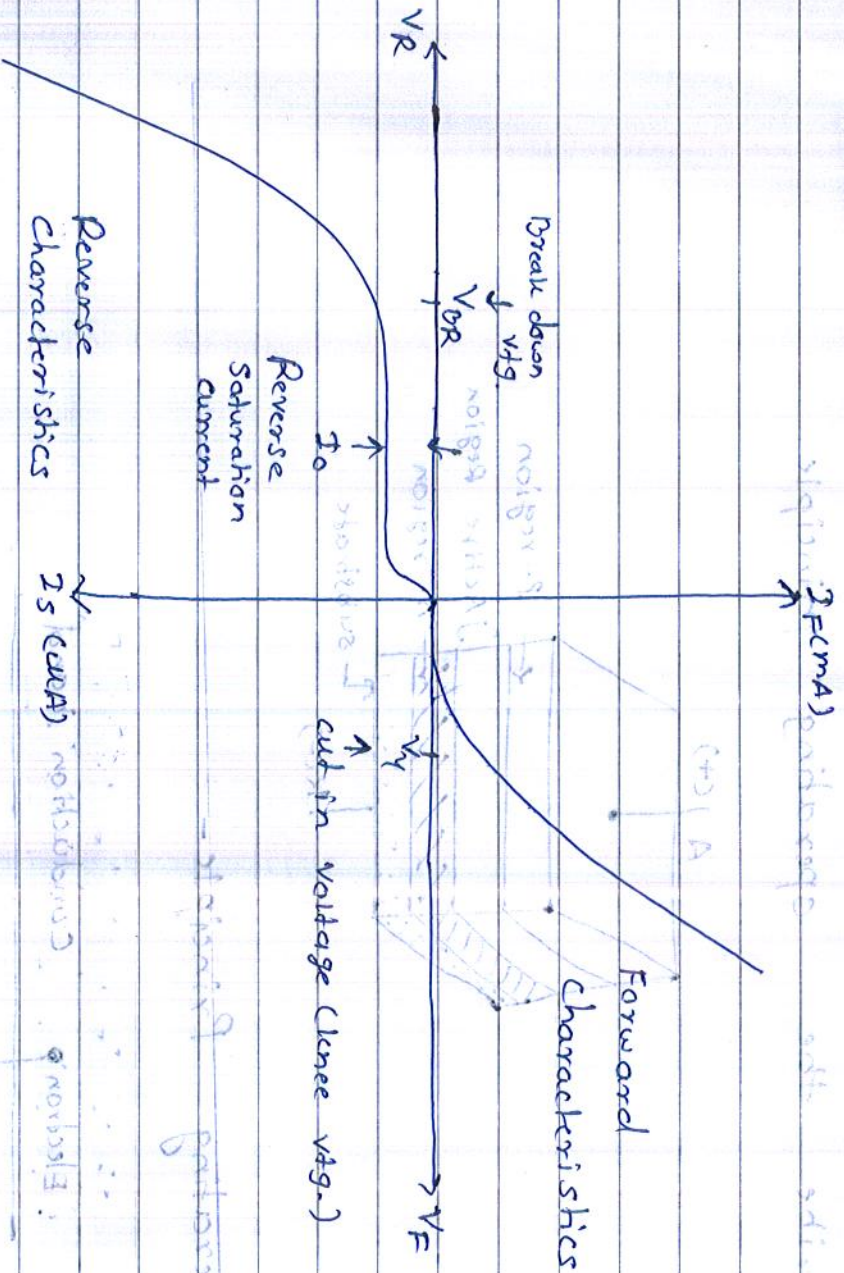
4) Draw the characteristics of PN junction diode and draw symbol of it.

Symbol \rightarrow



Potential

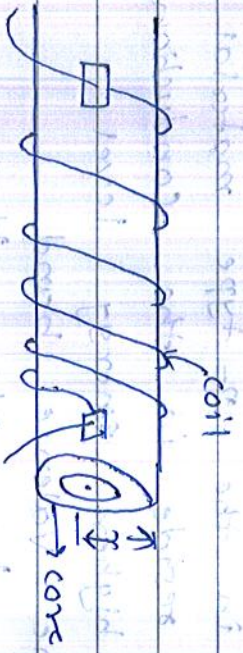
Characteristics of PN Junction diode



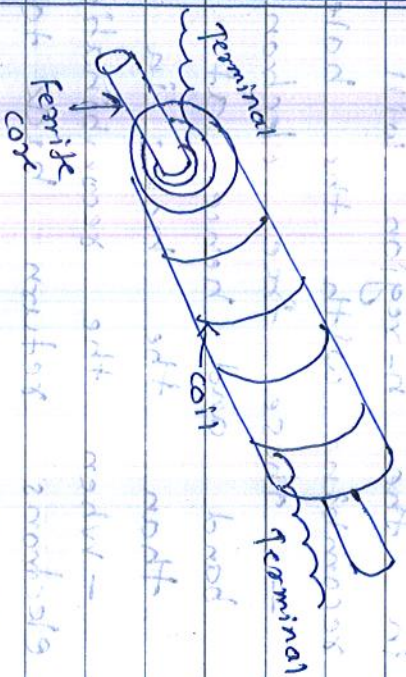
Q.2 1) Compare air core and ferrite core inductor on the basis of constructional diagram and applications.

Air Core Inductor

① Constructional diagram



Ferrite Core Inductor



② Applⁿ - ① used for intermediate or radio frequency in tuning coils.

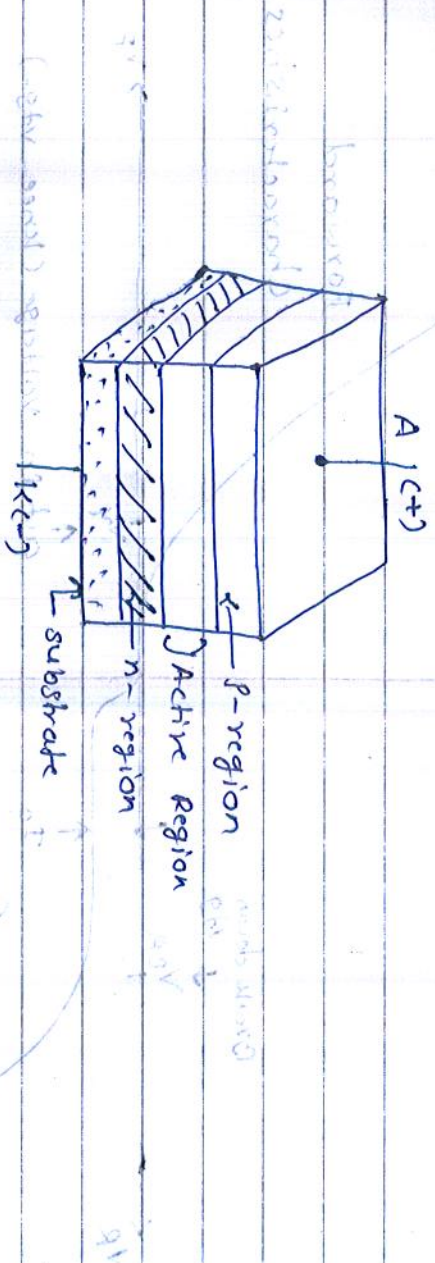
- ② Interstage Coupling
- ③ I.F. coils

② Applⁿ - ① used in high & medium frequencies

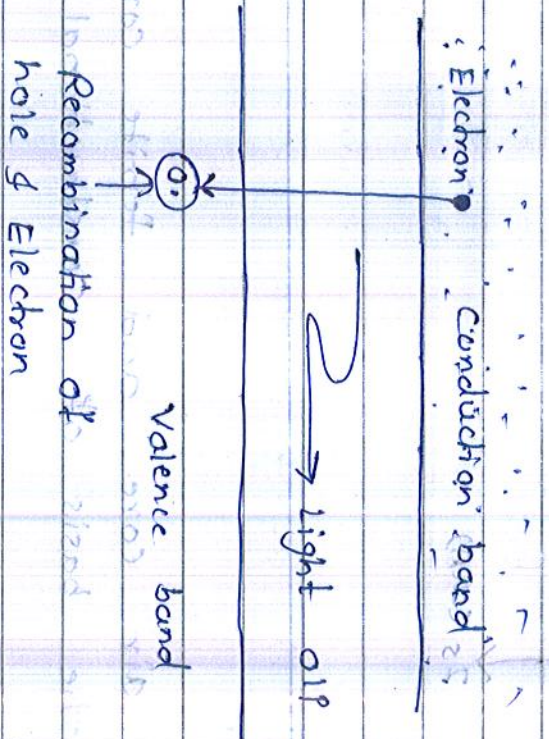
- ② used for medium wave receivers.

Possible

2) Draw the constructional details of LED
Describe the operating principle.



Operating Principle -



- When the LED is forward biased the electrons in the n-region will cross the junction and recombine with the holes in the p-type material.
- These free electrons reside in the conduction band and hence at a higher energy level than the holes in the valence band.
- When the recombination takes place these electrons return back to the valence band which is at a lower energy level than the conduction band.
- While returning back, the recombining electrons give away the excess energy in the form of light. This process is called as electroluminescence. In this way LED emits light.

Supervisor's Sign.	2
Main Answer Book -	
Supplements	
Total	21

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Marks											

Begin your answer from here

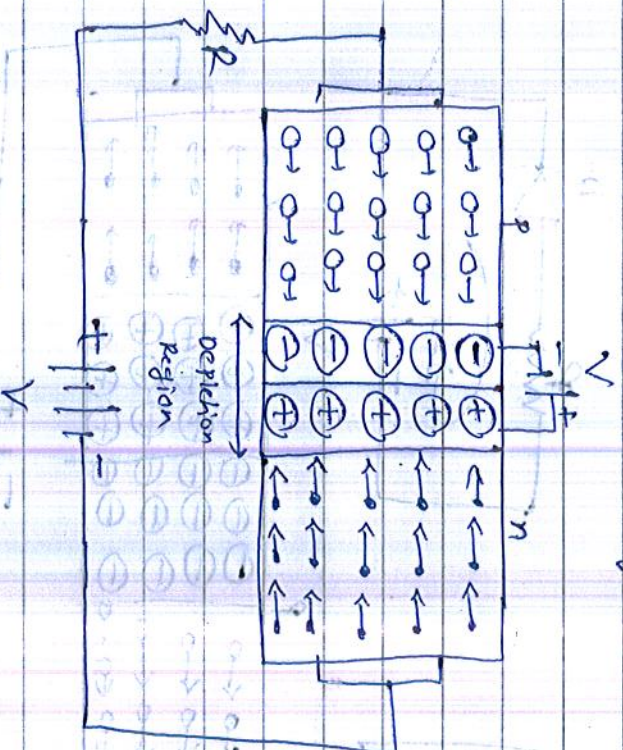
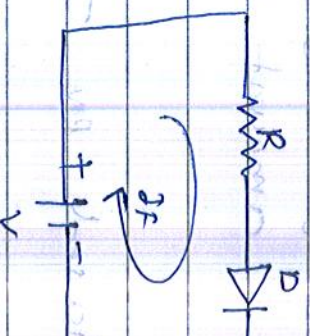
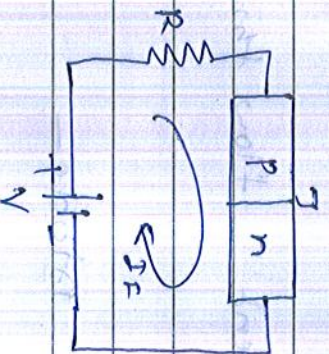
Question No.

3) Draw the symbol of PN junction diode. Describe its working principle and list two applications of the same.



Working principle -

① Forward Biased of a PN junction diode -



- If p-region is connected to the positive terminal of the DC source and n-side is connected to the negative terminal of the DC source then biasing is called as 'Forward Biasing'.

- Due to negative terminal of external source connected to the n-region free electrons from n-side are pushed towards the p-side.

Similarly the positive end of supply will push holes from p-side towards n-side.

- With increase in supply voltage V more and more number of holes and electrons start travelling towards the junction.

- Holes will start converting the $-ve$ ions into neutral atoms and electrons will convert the $+ve$ ions into neutral atoms.

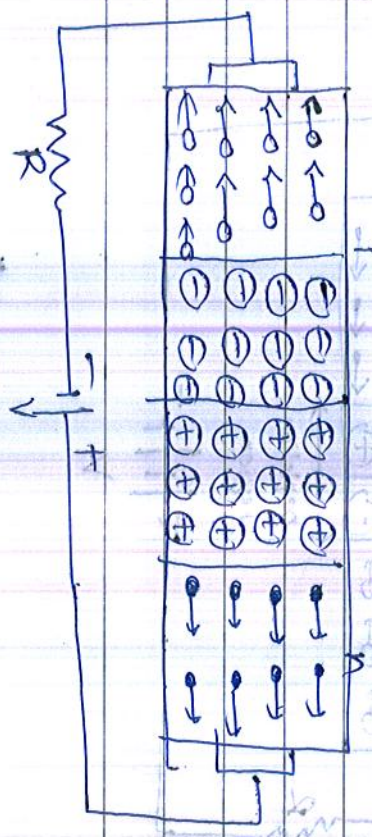
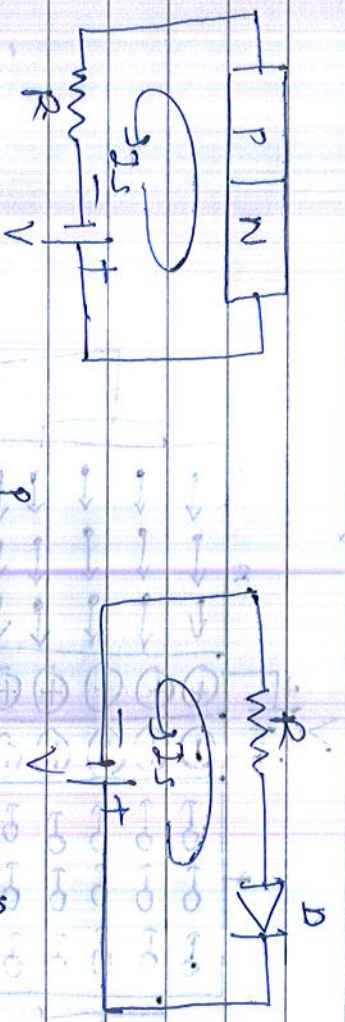
- As a result of this width of depletion region will reduce.

- Due to this barrier potential will reduce.

- At particular value of V depletion region will collapse. So there is no opposition to the flow of electrons & holes.

- Hence large amount of current flows through the diode.

② Reverse Biased PN Junction Diode



Positive

- If the p-side is connected to the negative terminal of the supply voltage and the n-side is connected to the positive terminal of supply then the diode is said to be reverse biased.
- When a diode is reverse biased holes in p-region are attracted towards the -ve terminal of supply and electrons on the n-side are attracted towards positive terminal of the supply.
- Due to movement of electrons and holes away from the junction width of depletion region increases.
- So Barrier potential increases.
- So very small current flows through the diode which is called as reverse saturation current.

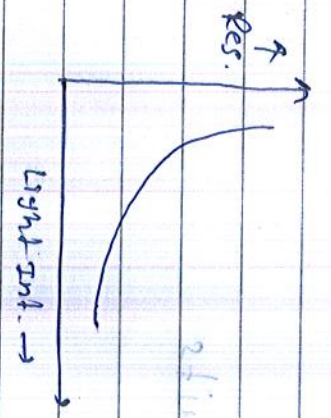
Applications-

- ① Rectifier circuits
- ② Clipping and clamping circuits
- ③ Feedback diodes
- ④ AM detector
- ⑤ Freewheeling diodes.

Q.3) Compare LDR & TDR on the basis of working principle, material used for construction, characteristic curves & applications.

① Working principle -
Resistance value of LDR changes with change in light intensity.

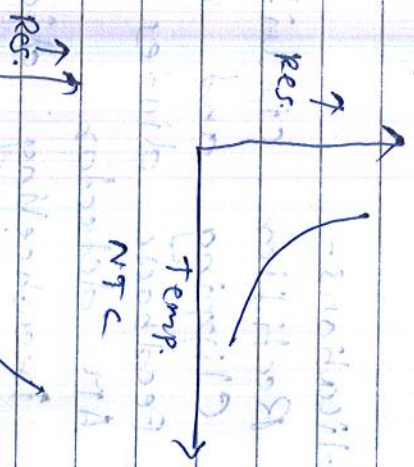
② Material used -
Cadmium sulphide, Gallium sulphide, lead sulphide etc.



③ Characteristic -

① Resistance value of TDR changes with change in temperature.

② Oxides of metals such as manganese, cobalt, titanium, copper & nickel.



③

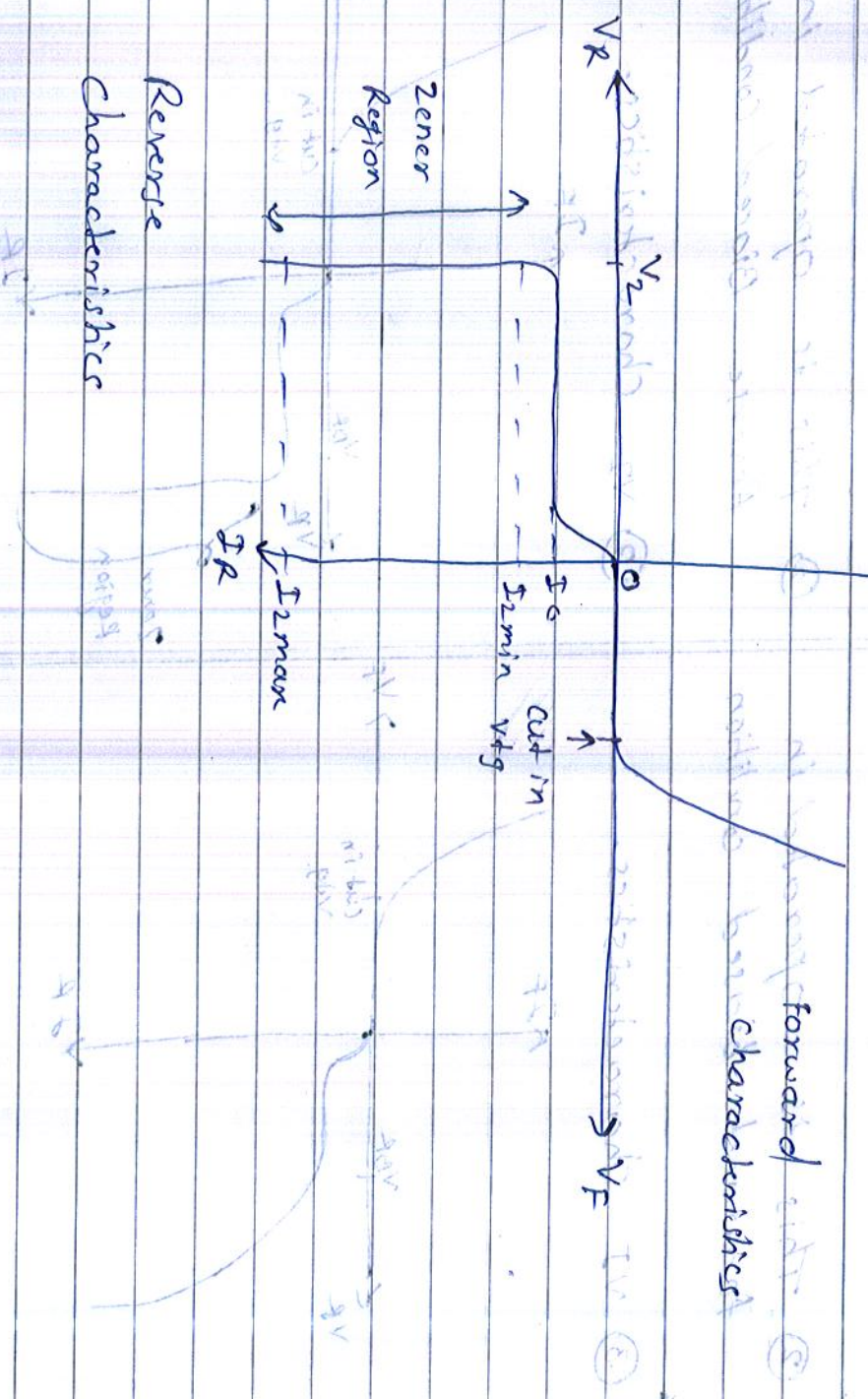
PTC

④ Applications -
Automatic contrast and brightness control in TV, in camera, street lights etc.

④ Automatic temp. control, used in flow meter, liquid level sensor, Temp. sensing in electric motors & transformers.

2) Draw the characteristics of Zener diode and list four applications of Zener diode.

Characteristics of Zener diode



* Applications -

- ① As Voltage Regulator
- ② As a regulated Power supply.
- ③ In the protection circuits for MOSFET
- ④ In the clipping circuits
- ⑤ In the pulse amplifier.

Possible

3) Compare PN Junction diode and Zener diode

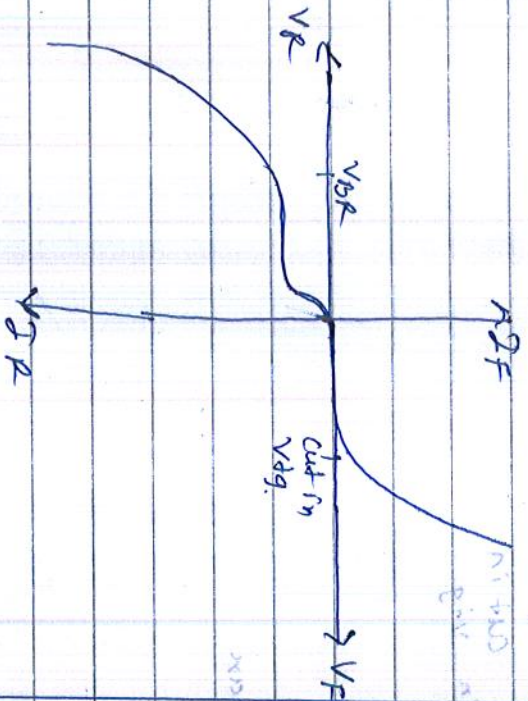
PN Junction diode

① Symbol -



② This is operated in forward biased condition

③ VI Characteristics -



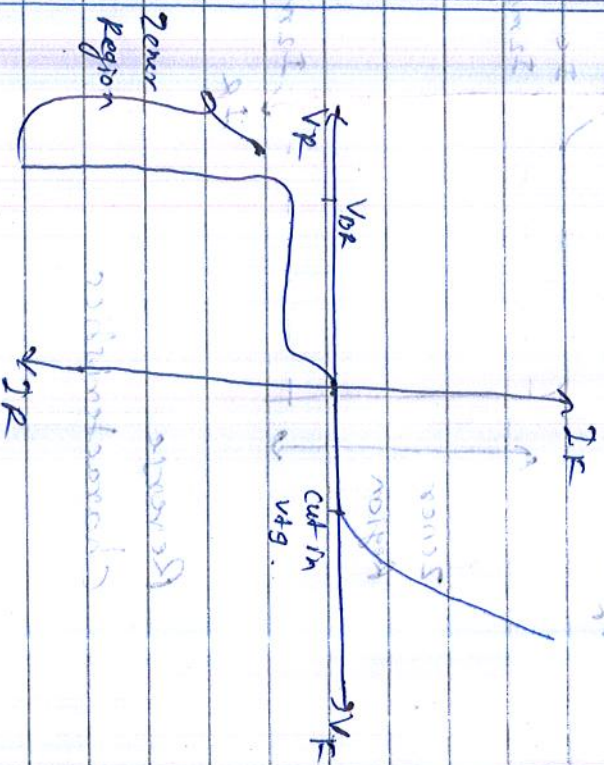
Zener diode

① Symbol -



② This is operated in Reverse Biased Condition.

③ VI Characteristics -



④ Applications -
In rectifiers, clippers,
Clampers etc.

④ Applications -
Voltage Regulators,
Voltage limiters etc.