



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
COIMBATORE-35

Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

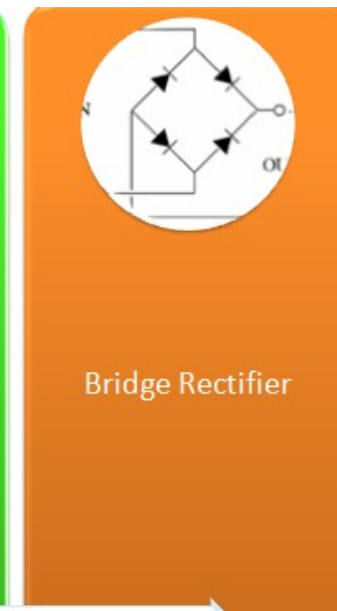
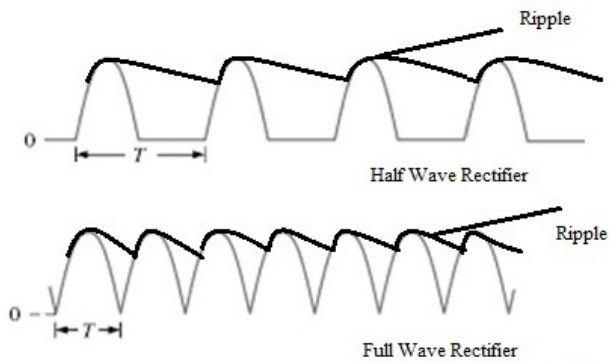
19EET202 / ANALOG ELECTRONICS II YEAR / III SEMESTER

UNIT-I: PN JUNCTION DEVICE

HALF & FULL WAVE RECTIFIER



TOPIC OUTLINE





Introduction

- A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which is in only one direction, a process known as rectification.

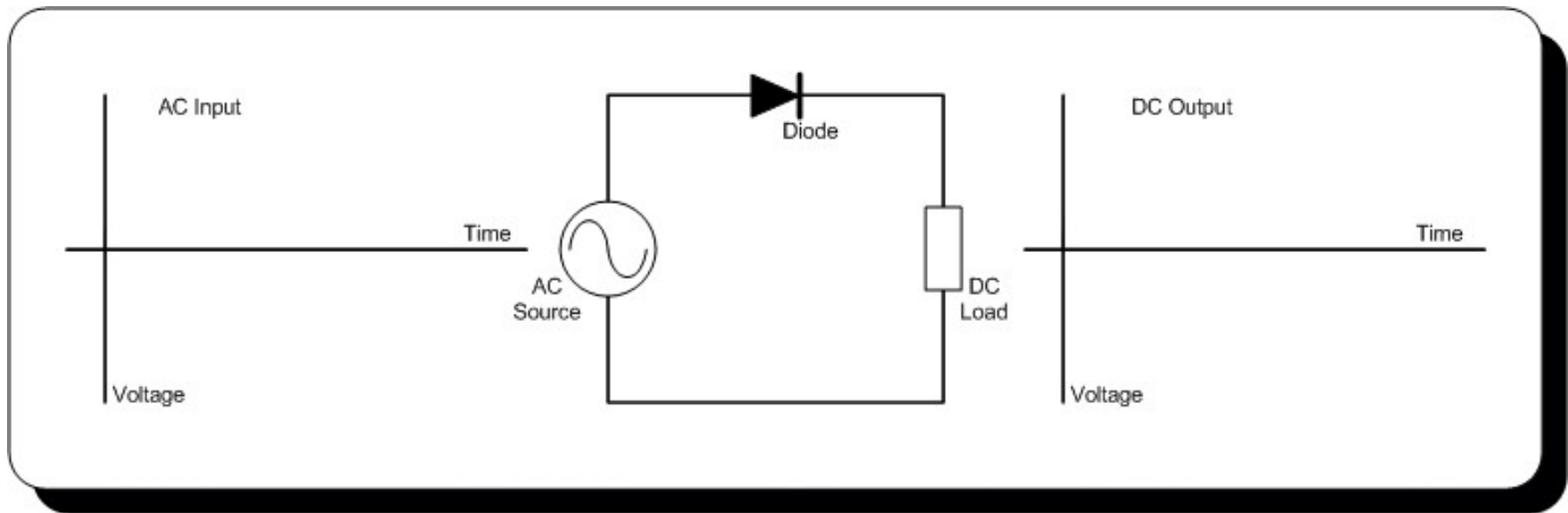


Types of Rectifiers

- ➔ Half wave Rectifier
- ➔ Full wave Rectifier
- ➔ Bridge Rectifier

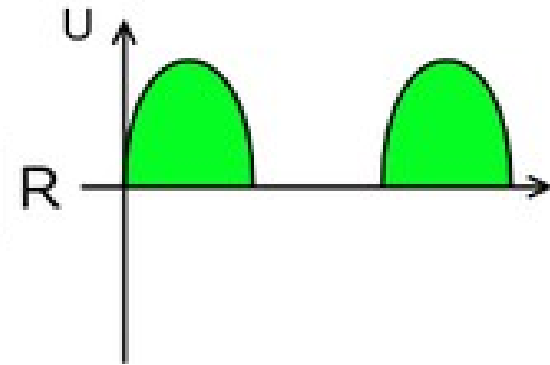
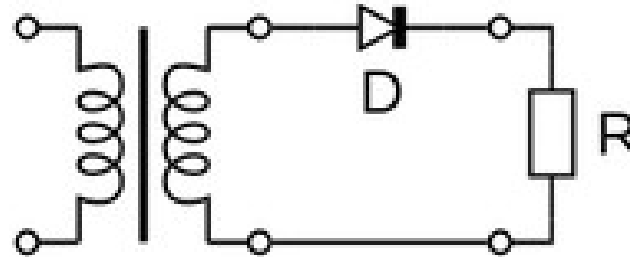
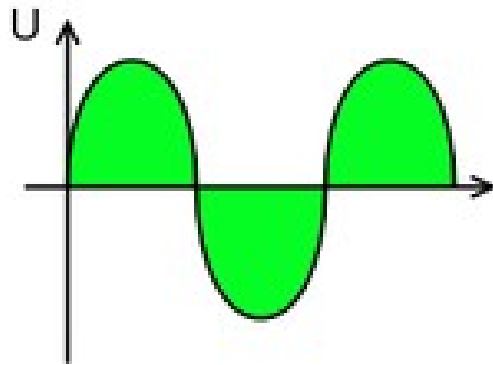


Half wave rectifier working animation



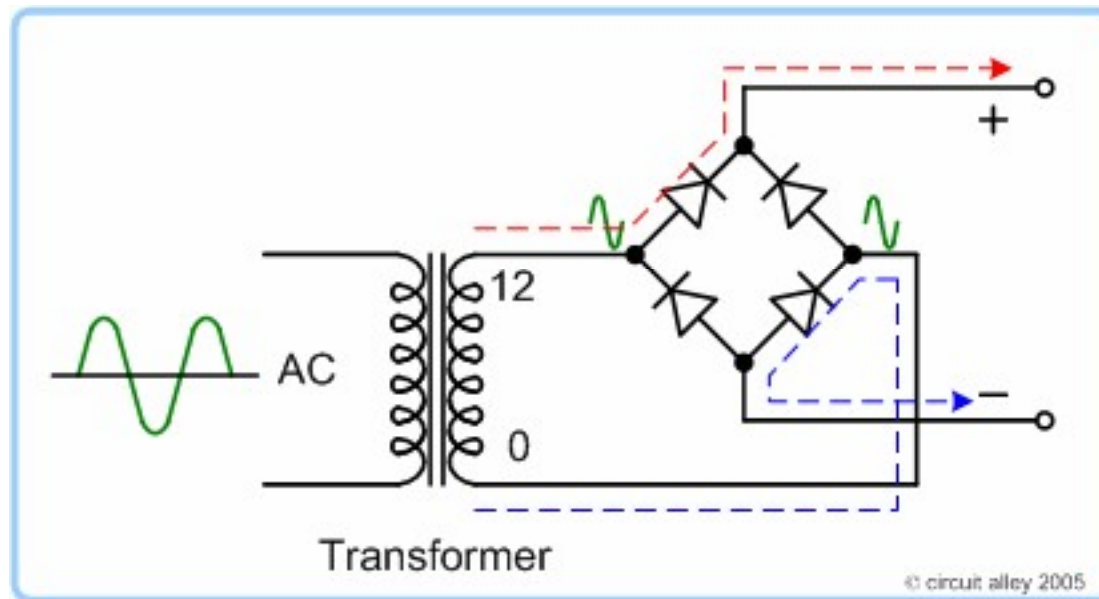


Half wave rectifier



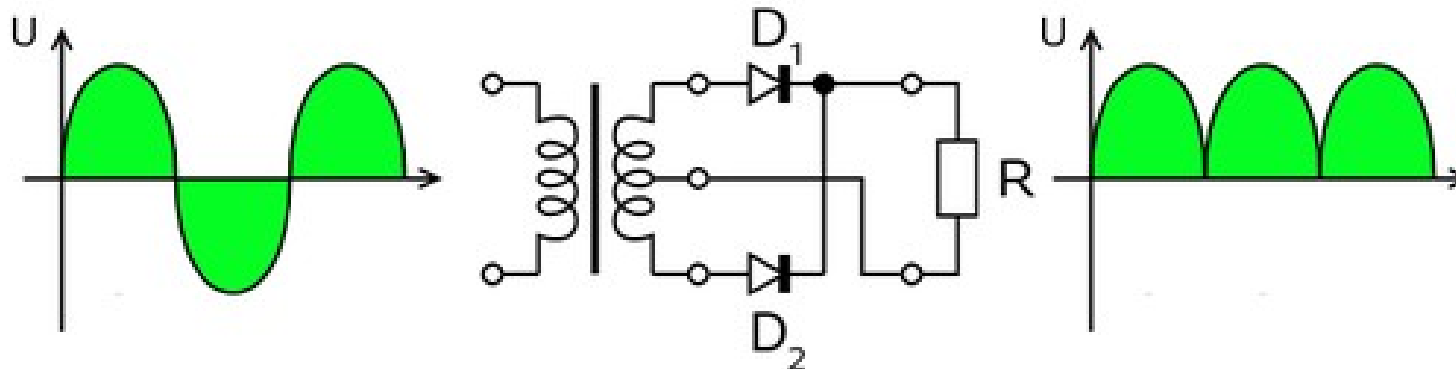


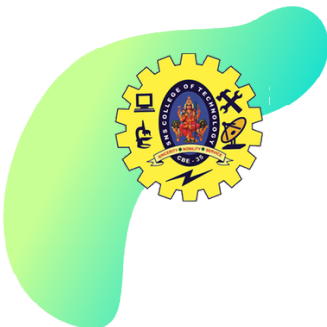
Full wave rectifier working animation



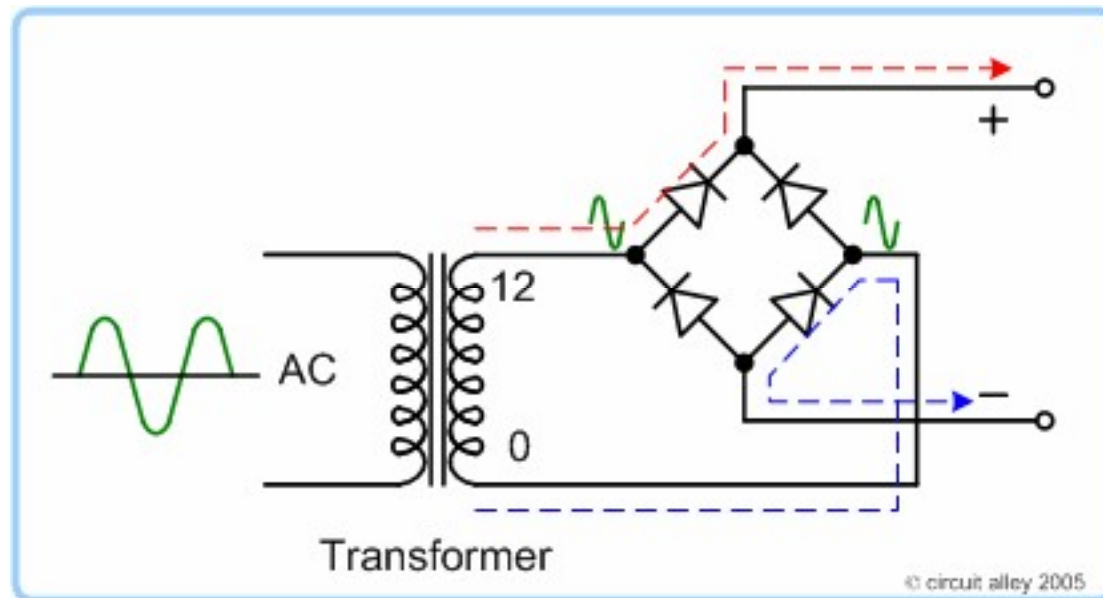


Full wave rectifier using transformer and 2 diodes



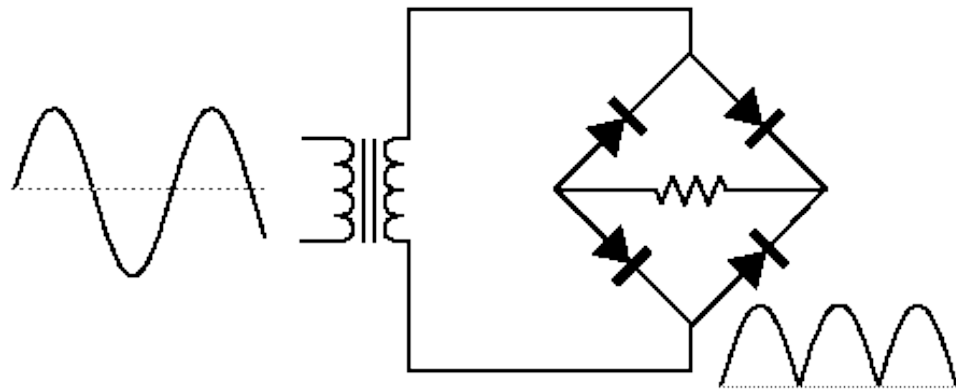


Full wave rectifier working animation



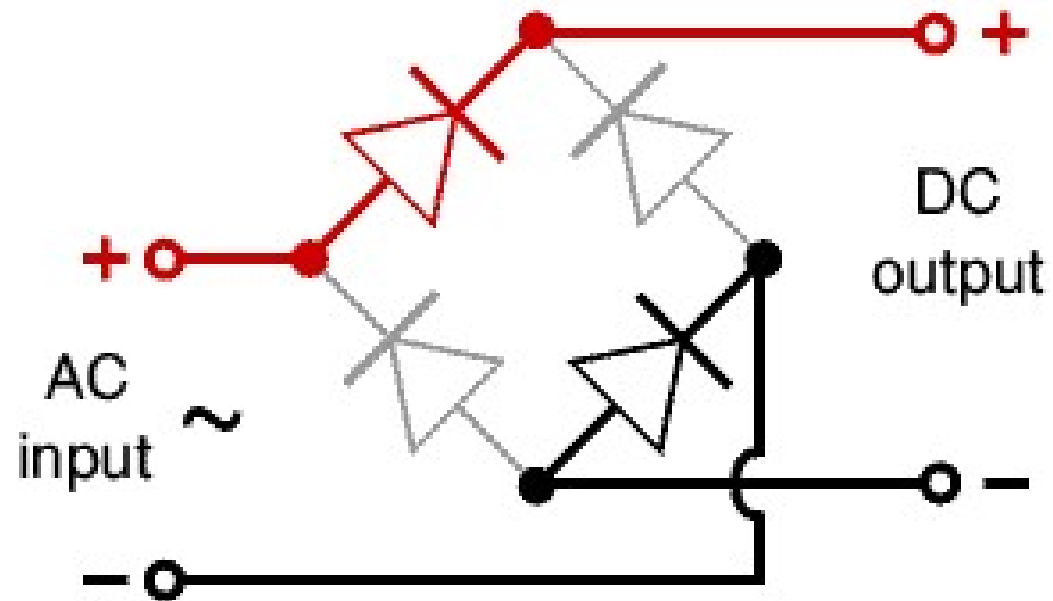


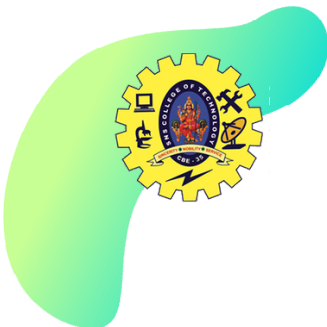
bridge Rectifier



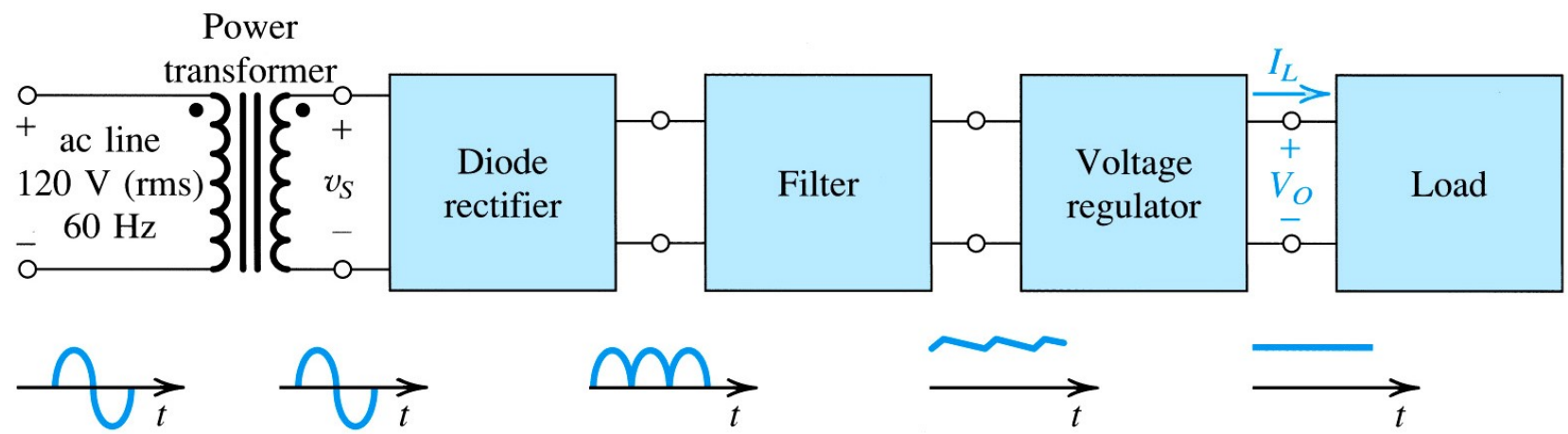


bridge Rectifier Animation





Block diagram of a dc power supply





Contd..

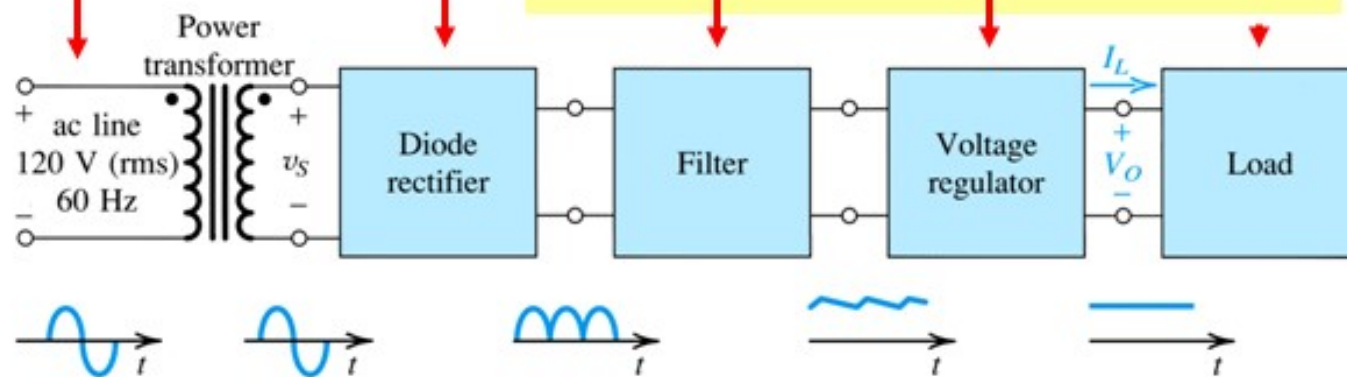
step #1: increase / decrease rms magnitude of AC wave via power transformer

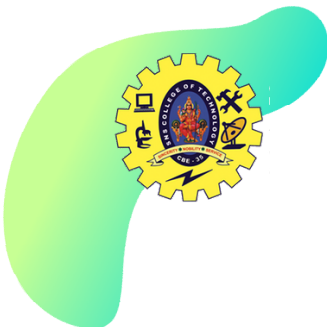
step #2: convert full-wave AC to half-wave DC (still time-varying and periodic)

step #3: employ low-pass filter to reduce wave amplitude by $> 90\%$

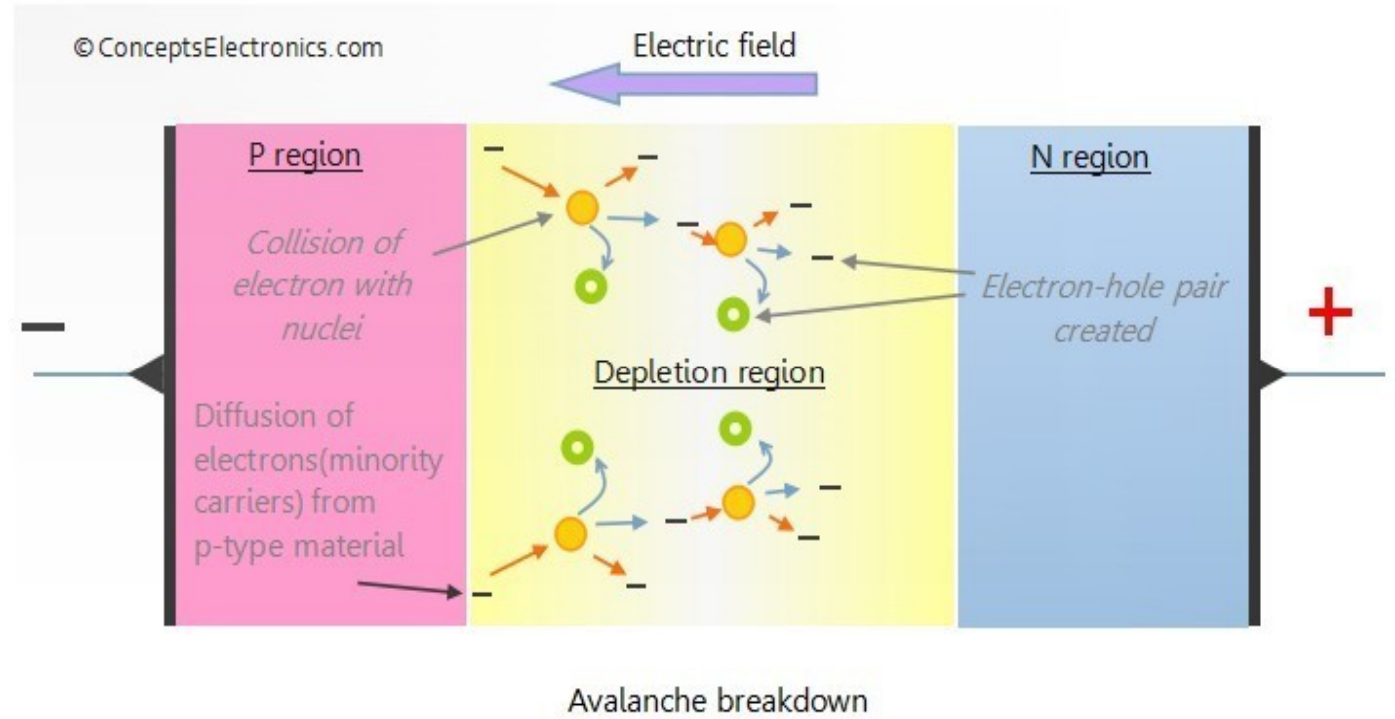
step #4: employ voltage regulator to eliminate ripple

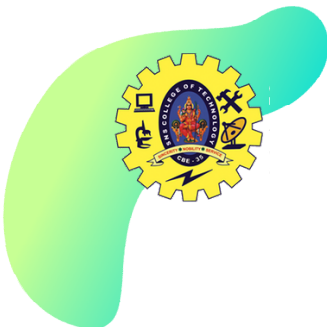
step #5: supply dc load



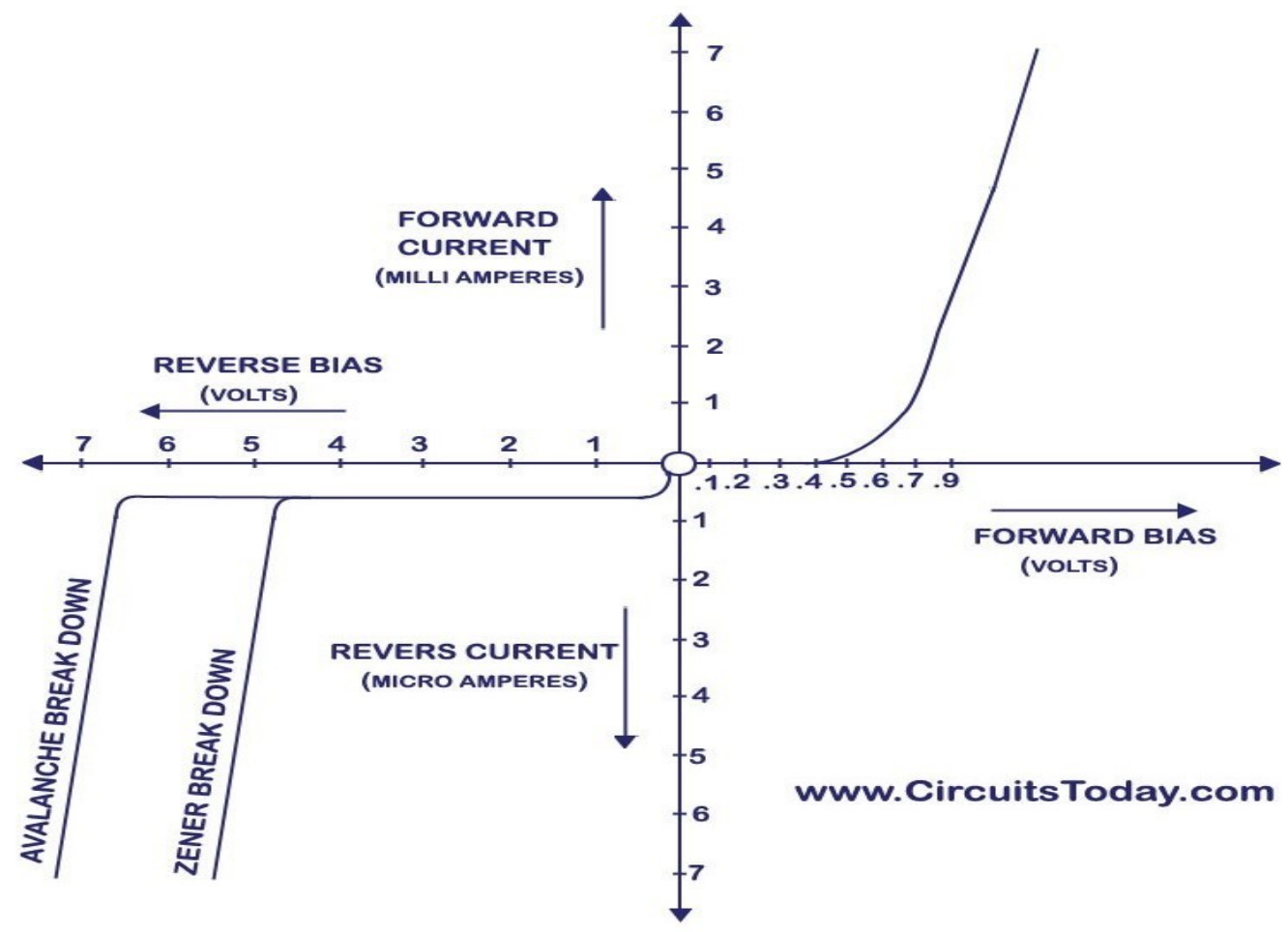


Avalanche Breakdown Mechanism





PN JUNCTION BREAKDOWN CHARACTERISTICS



DIFFERENCE BETWEEN ZENER AND AVALANCHE BREAKDOWN



Zener Breakdown

1. This occurs at junctions which being heavily doped have narrow depletion layers
2. This breakdown voltage sets a very strong electric field across this narrow layer.
3. Here electric field is very strong to rupture the covalent bonds thereby generating electron-hole pairs. So even a small increase in reverse voltage is capable of producing Large number of current carriers.
4. Zener diode exhibits negative temp: coefficient. I.e. breakdown voltage decreases as temperature increases.

Avalanche breakdown

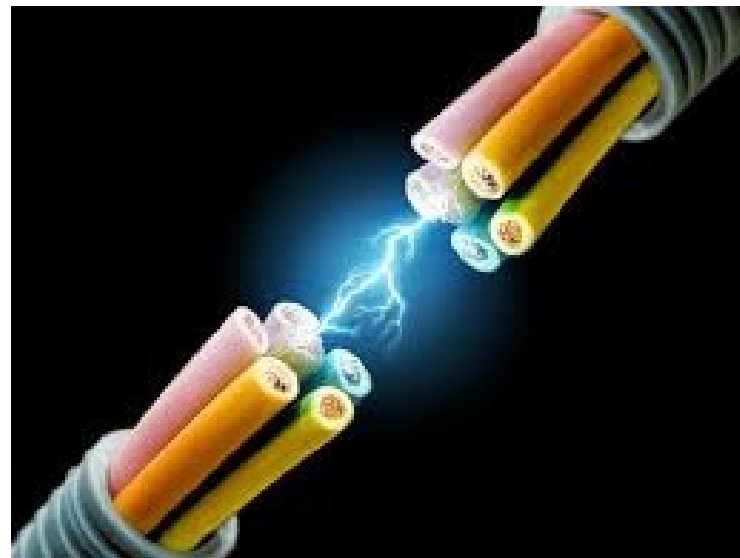


1. This occurs at junctions which being lightly doped have wide depletion layers.
2. Here electric field is not strong enough to produce Zener breakdown.
3. Her minority carriers collide with semi conductor atoms in the depletion region, which breaks the covalent bonds and electron-hole pairs are generated. Newly generated charge carriers are accelerated by the electric field which results in more collision and generates avalanche of charge carriers. This results in avalanche breakdown.
4. Avalanche diodes exhibits positive temp: coefficient. i.e breakdown voltage increases with increase in temperature.





RECAP....



...THANK YOU

