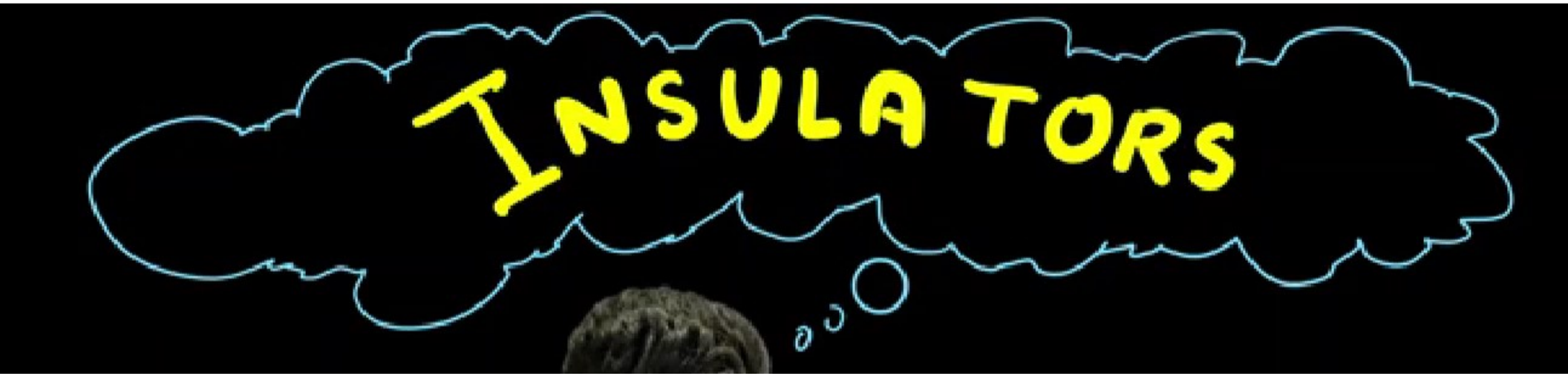
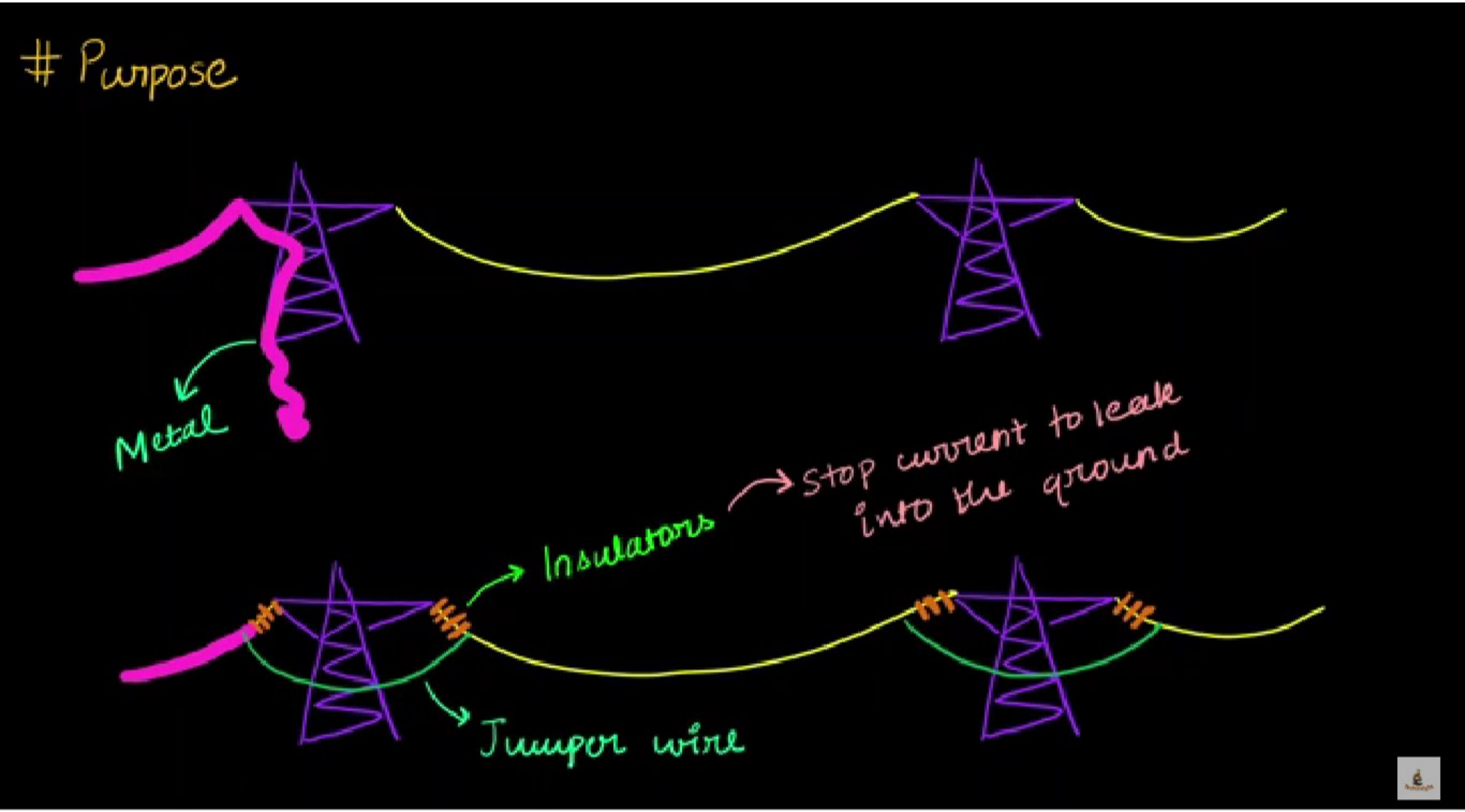

INSULATORS


Purpose
Metal
Insulators
Stop current to leak into the ground
Jumper wire

Desired Properties

1. High mechanical strength → To withstand conductor's load, wind load
   mech^{m} die Insulator

2. High electrical Resistance → To avoid current leakage
   material Temp

3. High { dielectric constant &
   dielectric strength

Insulator → Voltage rating
Break
Dielectri

Desired Properties

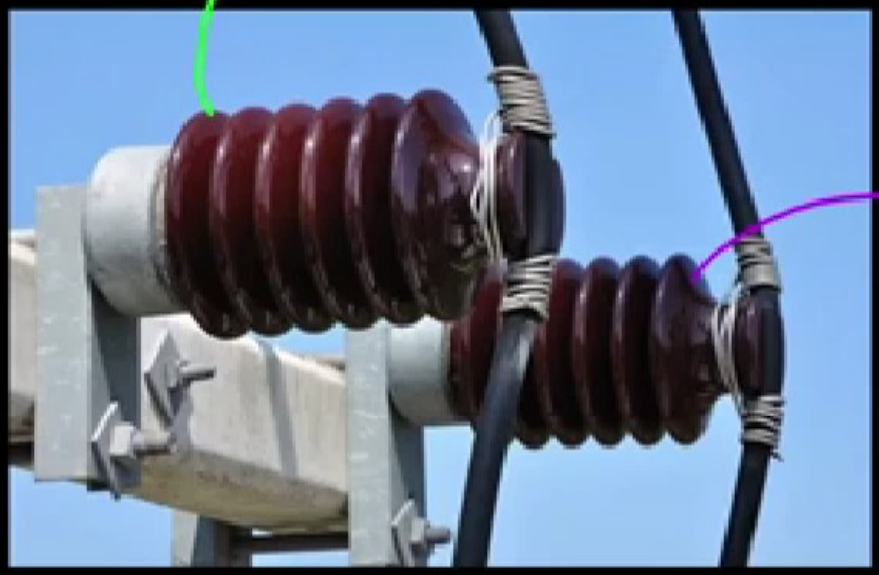
1. High mechanical strength → To withstand conductor's load, wind load

2. High electrical Resistance → To avoid current leakage

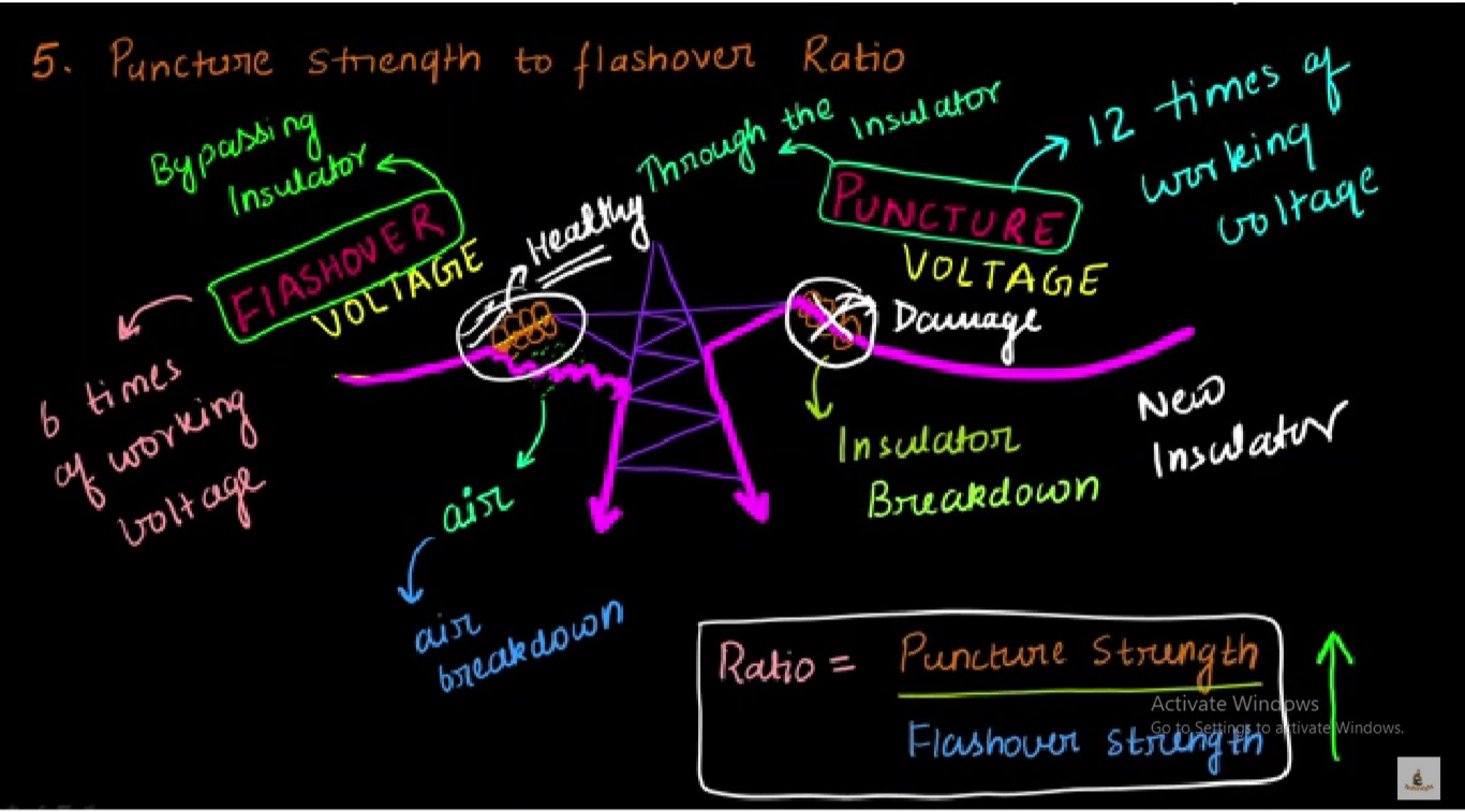
3. High dielectric constant → good quality insulator

   dielectric strength → Can withstand high voltage

4. Insulator's material :

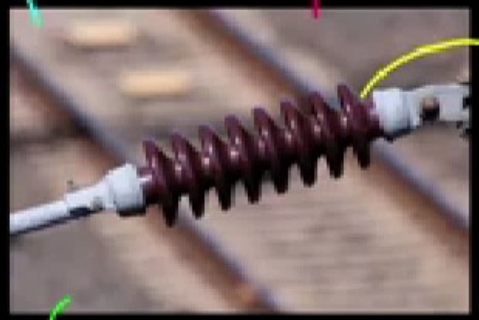


5. Puncture strength to flashover Ratio



$$\text{Ratio} = \frac{\text{Puncture Strength}}{\text{Flashover strength}}$$

Commonly used material



Less temp. sensitive

Dielectric strength = 60kV/cm

Material:

China clay, Quartz, Aluminium silicate

Porcelain Insulator

140kV/cm

dielectric strength

toughened glass

material

Very less temp. sensitive

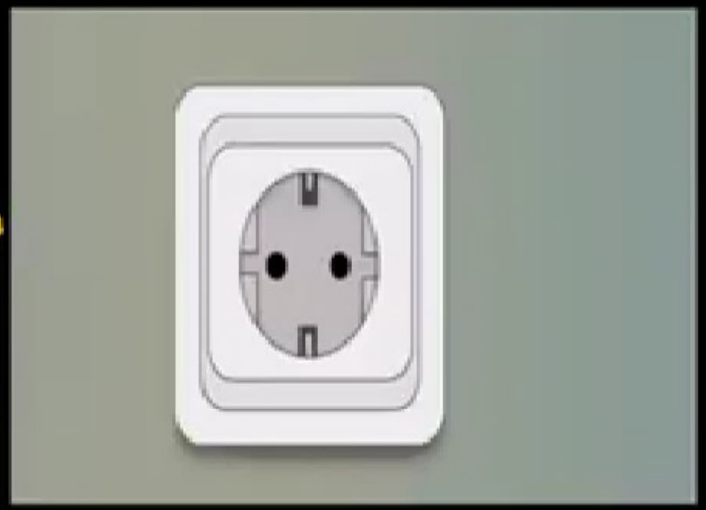
Glass Insulator

Objective

Power generated = Power Demanded

Meet

Consumer Demand




LOAD ON POWER SYSTEM

#Challenges of Power System

Operate at max^m η

Alternator runs at rated Capacity

Variable in nature → Force alternator to run below or above rated Capacity

Power generated = Power Demanded

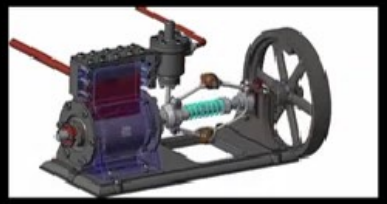
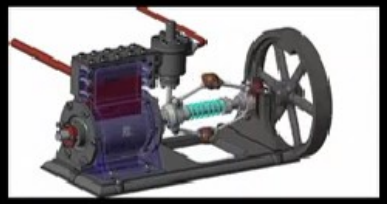
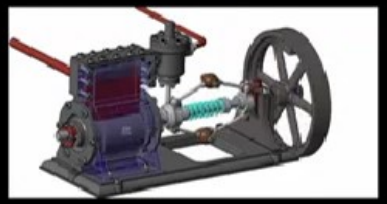
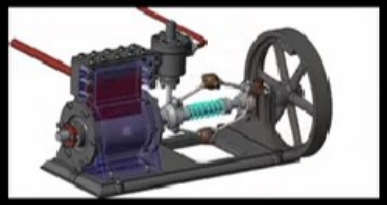
Power Waste ← $P_g > P_D$

"As we can't store excessive power"

$P_g < P_D$ → "System Collaps"

Effect of Variable Load

1. Need extra generating units to meet increased load demand.

Normally Switch OFF

2. Need extra raw material, during peak time

3. Increase in Production Cost

Cost of Production → Minimum → η_{max} → Operate at → Full load Capacity

* During light load periods → Plant operates → Below rated Capacity → Increase → Production Cost

Load Behavior

To analyze Load Behavior
- Load Curve
- Load duration Curve

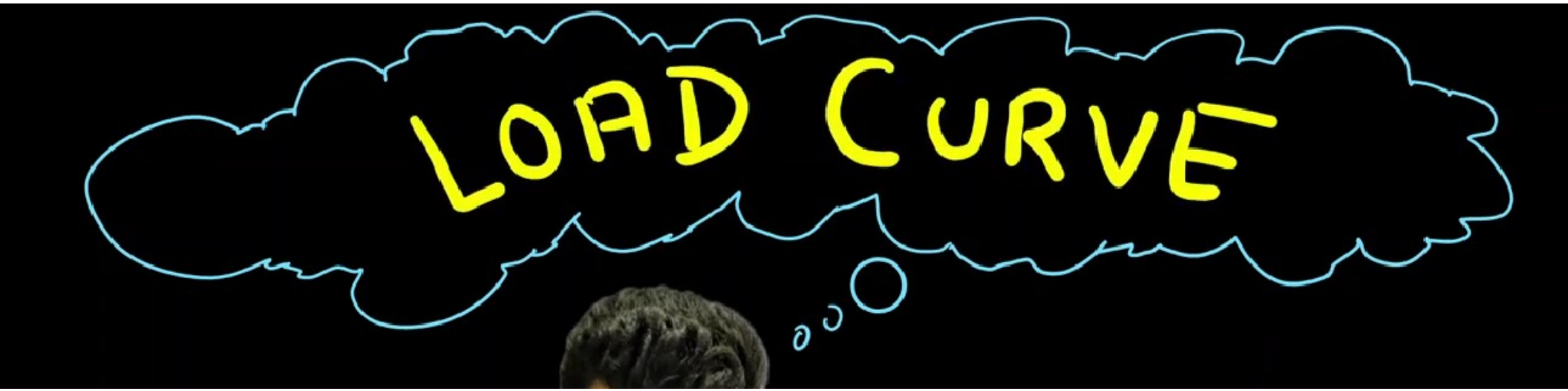
- Important to analyse load on power station
- For safe electrical installment and accurate station sizing

Power generated = Power Demanded

Variable in nature

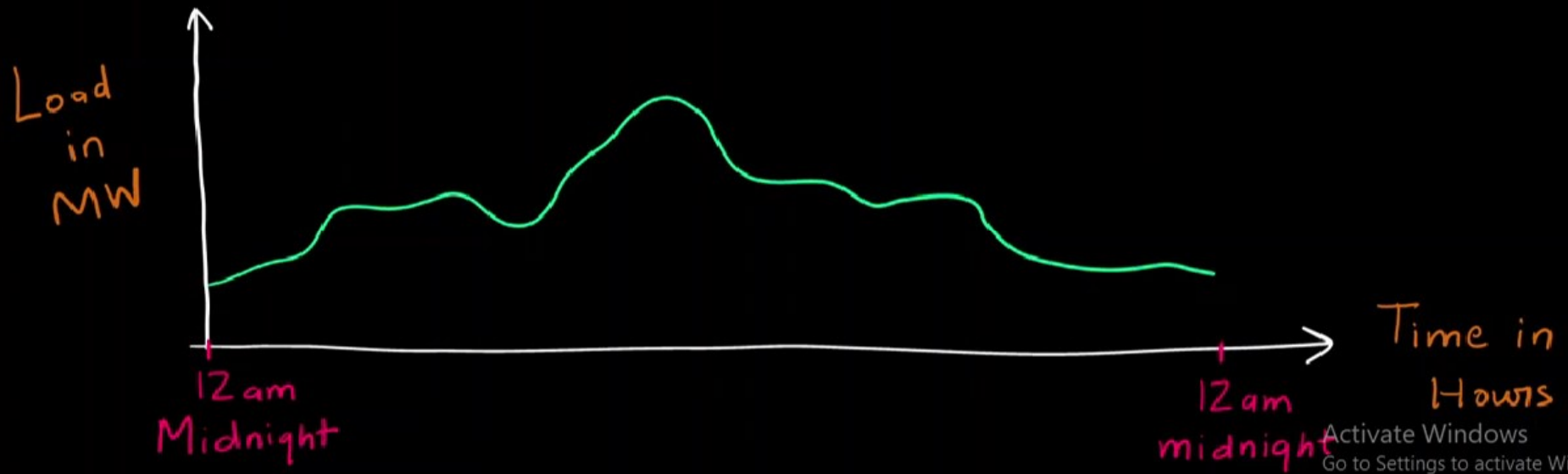
study

LOAD CURVE

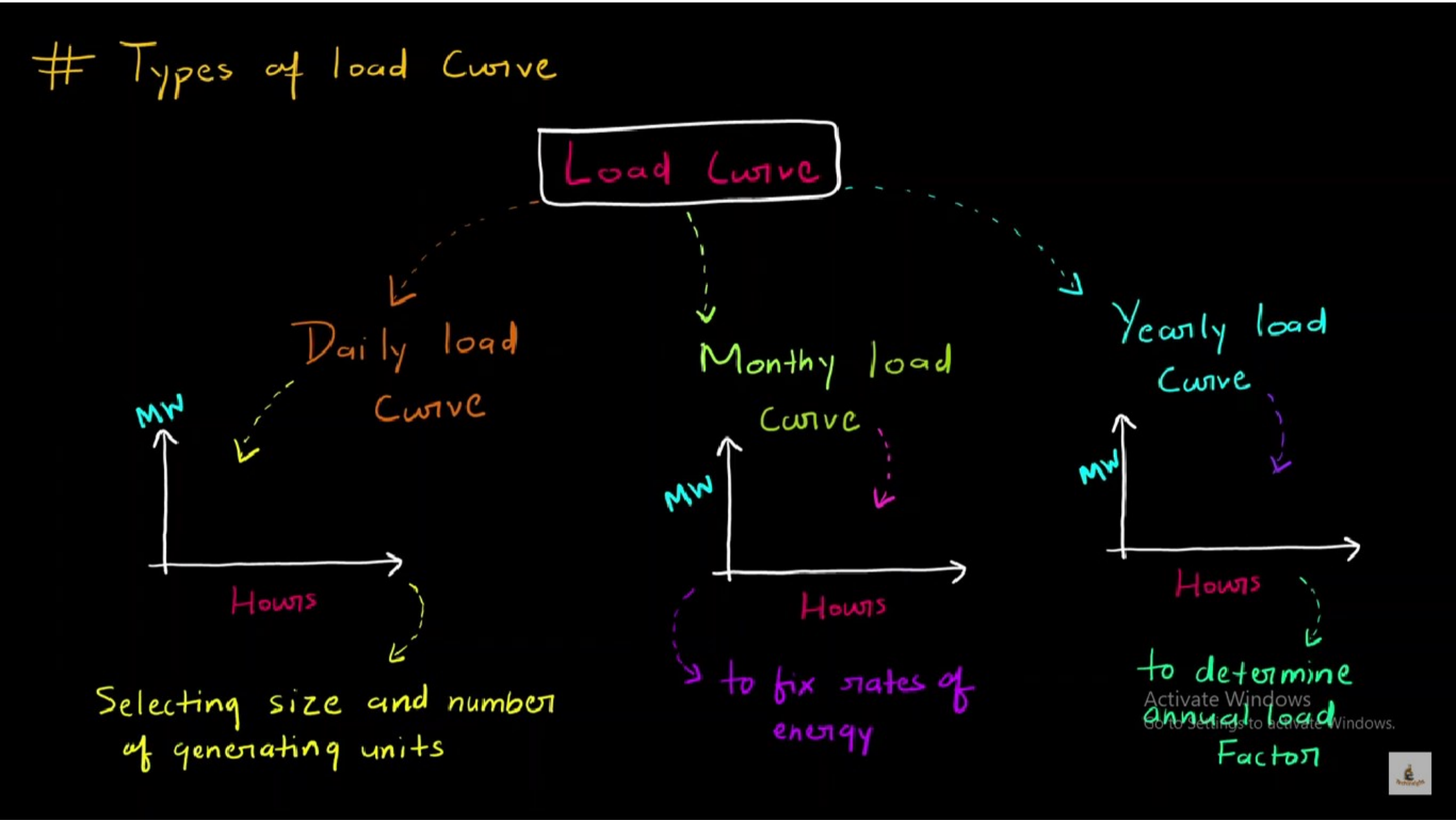

LOAD CURVE

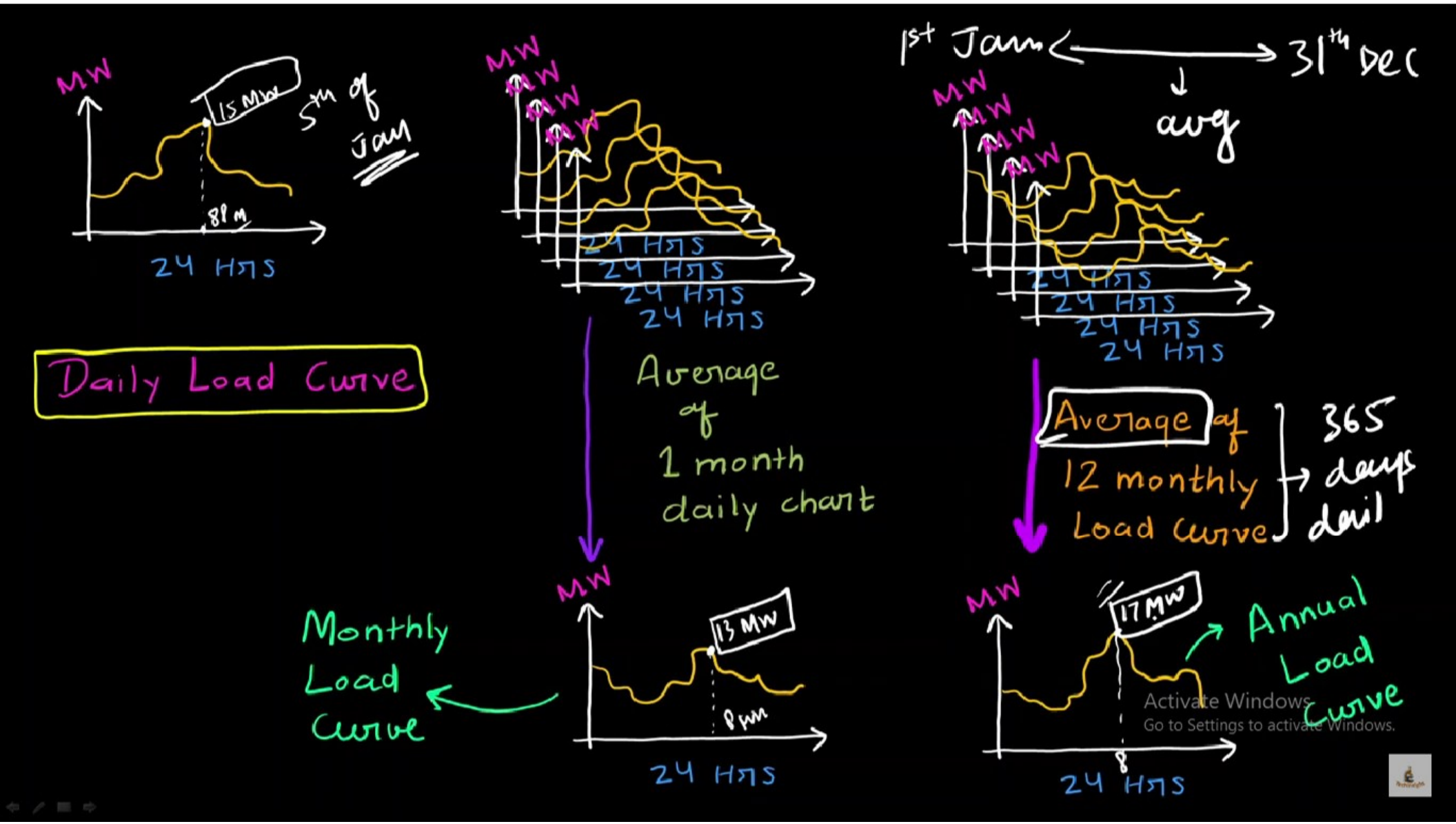
Load Curve

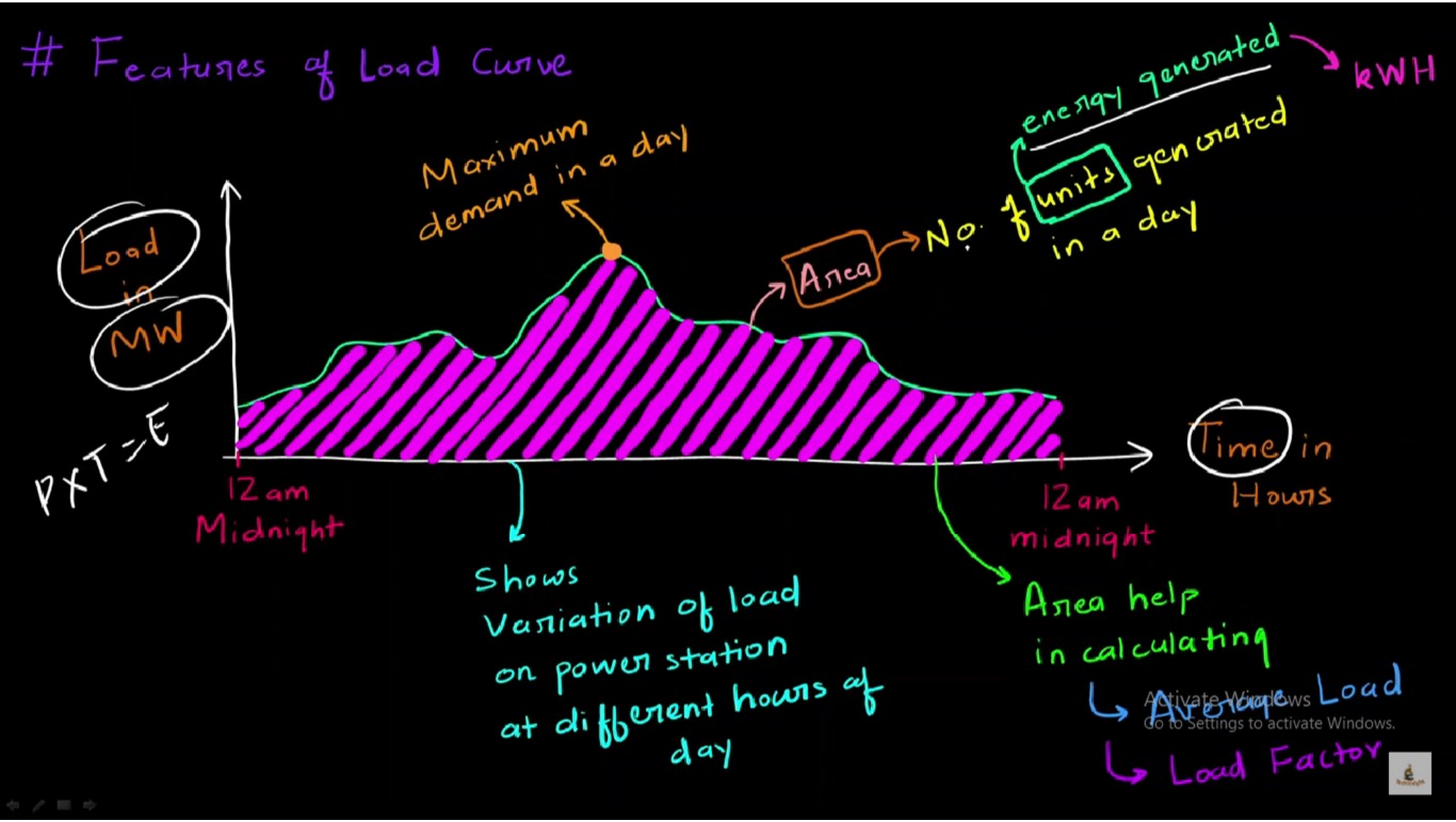
Curve showing variation in load on Power Station w.r.t time



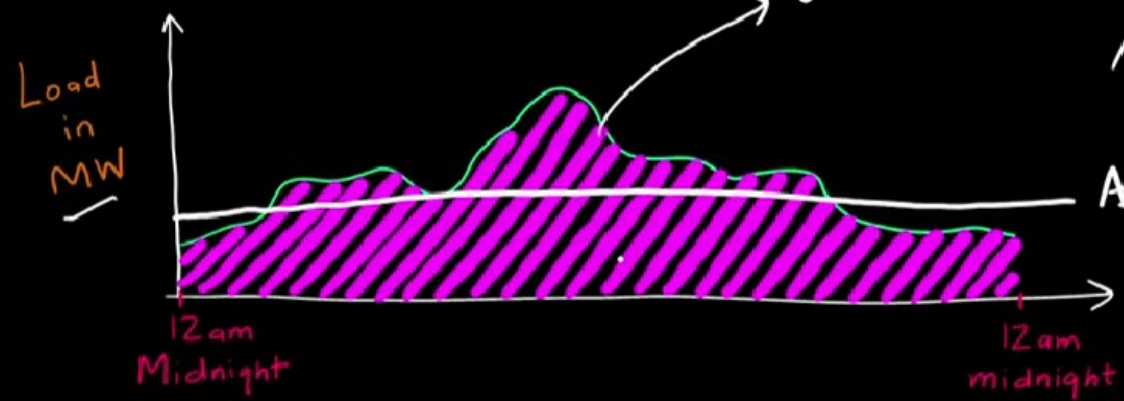
Types of load Curve




MW
15 MW
5th of Jan
8 pm
24 Hrs
Daily Load Curve
MW
24 Hrs
24 Hrs
24 Hrs
24 Hrs
Average of 1 month daily chart
MW
13 MW
8 pm
24 Hrs
Monthly Load Curve
1st Jan
31th Dec
avg
MW
24 Hrs
24 Hrs
24 Hrs
24 Hrs
Average of 12 monthly Load Curve
365 days data
MW
17 MW
8
24 Hrs
Annual Load Curve
Activate Windows
Go to Settings to activate Windows.


Features of Load Curve
Load in MW
P X T = E
Maximum demand in a day
Area
No. of units generated in a day
energy generated
kWH
12 am Midnight
12 am midnight
Time in Hours
Shows Variation of load on power station at different hours of day
Area help in calculating
Average Load
Load Factor
Activate Windows
Go to Settings to activate Windows.

AVERAGE LOAD



area = 100 × 2400 kWh / 24 H = 100 MW

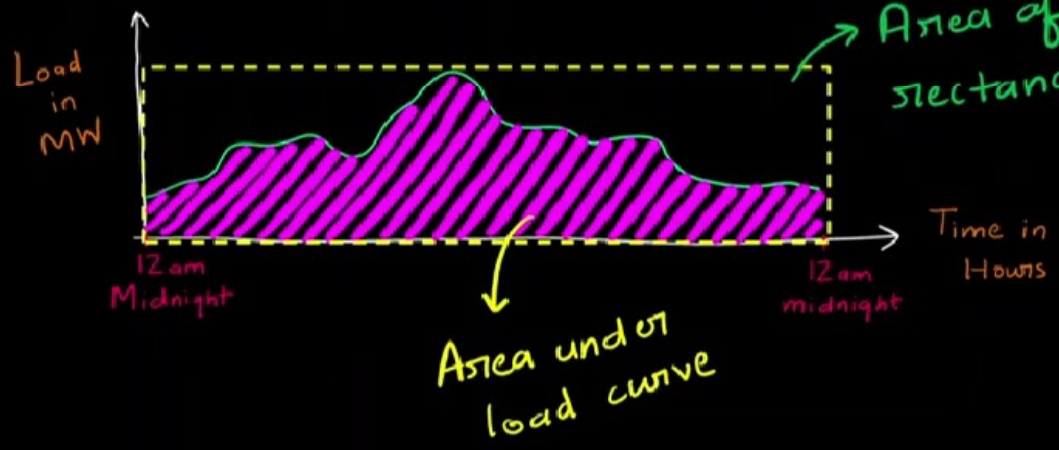
Avg. Load = 100 MW

$$\text{Average Load} = \frac{\text{Area under daily Load curve}}{\text{24 Hours}} = \frac{\text{Units in kWH}}{\text{24 Hrs}}$$

Load Factor

$$LF = \frac{\text{Area under Load curve}}{\text{Total area of rectangle in which load curve is present}} = \frac{\text{Area}}{24\ \text{Hrs}} \times \text{Maximum Demand} = \frac{\text{Avg. Load}}{\text{Max. Demand}}$$

Average load



24 Hrs

$l \times b$

Maximum demand

What is Load Duration Curve

"When load elements of a Load Curve are arranged in the order of Descending magnitude, the curve obtained is called Load Duration Curve"

* Load duration curve is obtained from same Load curve, But loads are arranged in Descending [decreasing] order
* In load duration curve, Maximum Load is on Left side of curve and Minimum Load is on Right Side

5MW

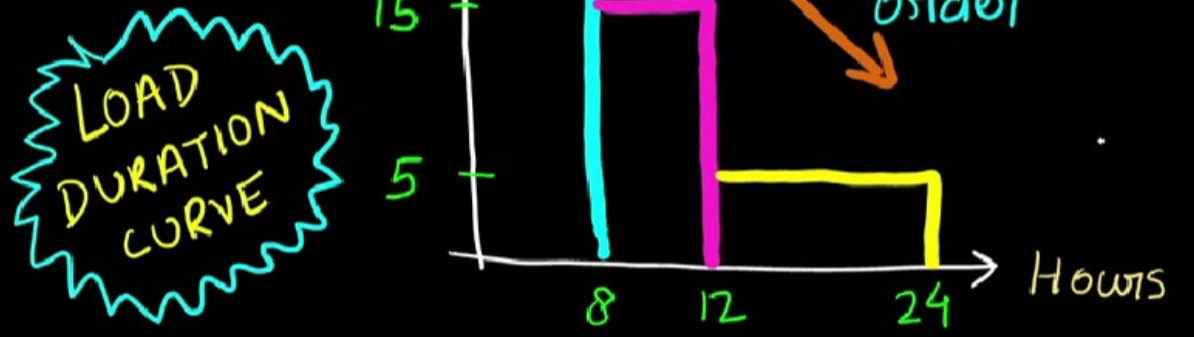
12am – 12am

10MW

4am – 4pm

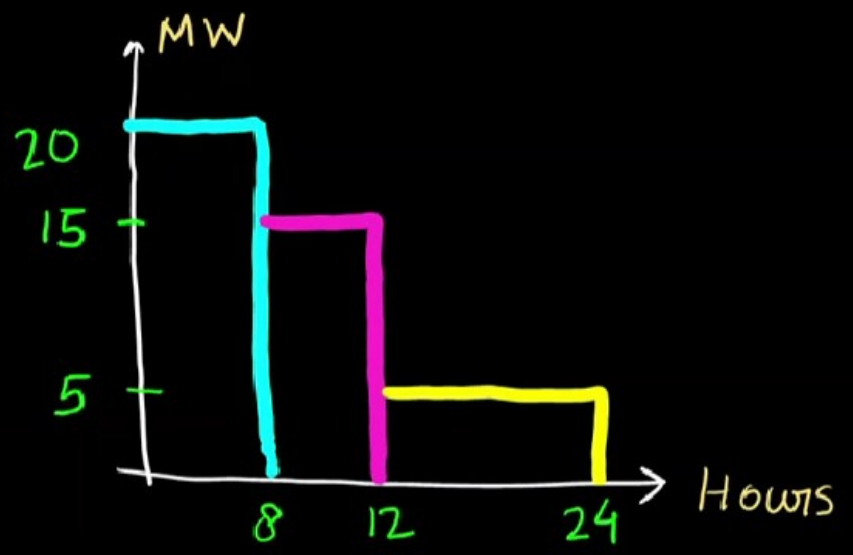
5MW

8am – 4pm



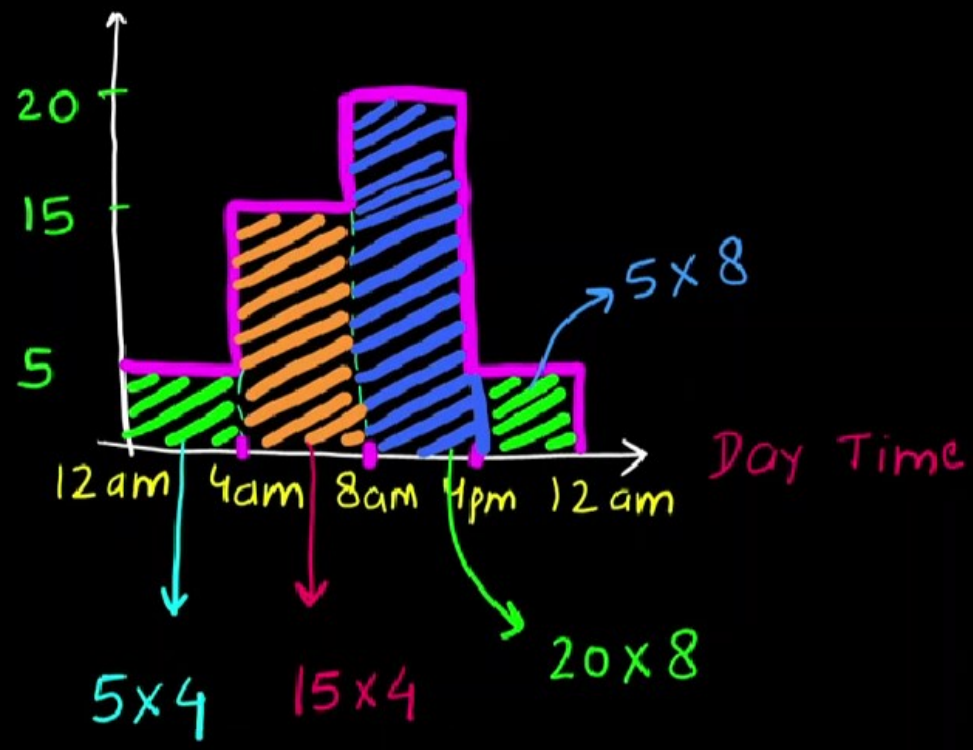
Load Curve

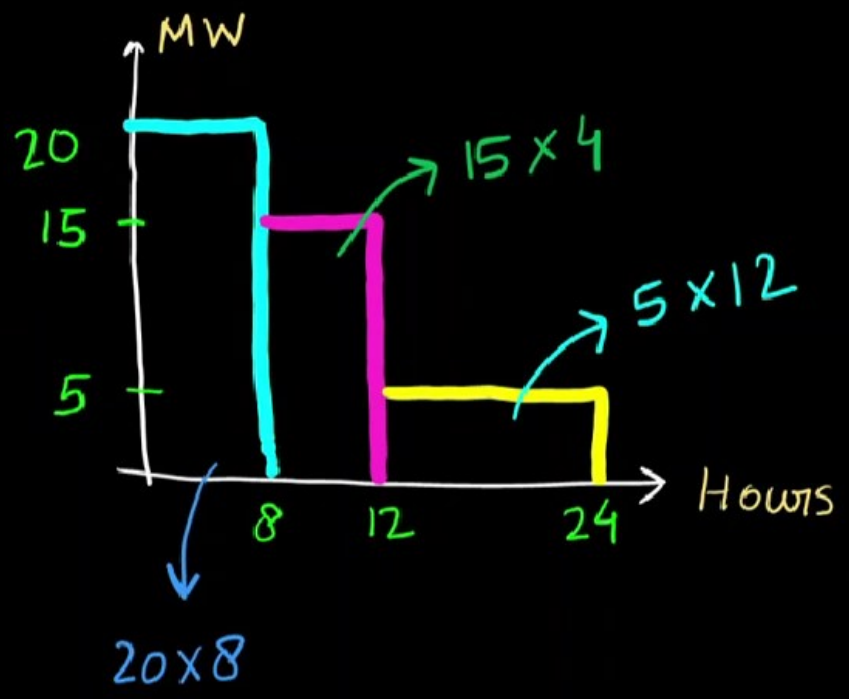
किस Time
कितना Load है



Load Duration Curve

कितने Time तक
कितना Load है





Area = 280 MWH = Area = 280 MWH

Area under load curve

Area under load duration curve