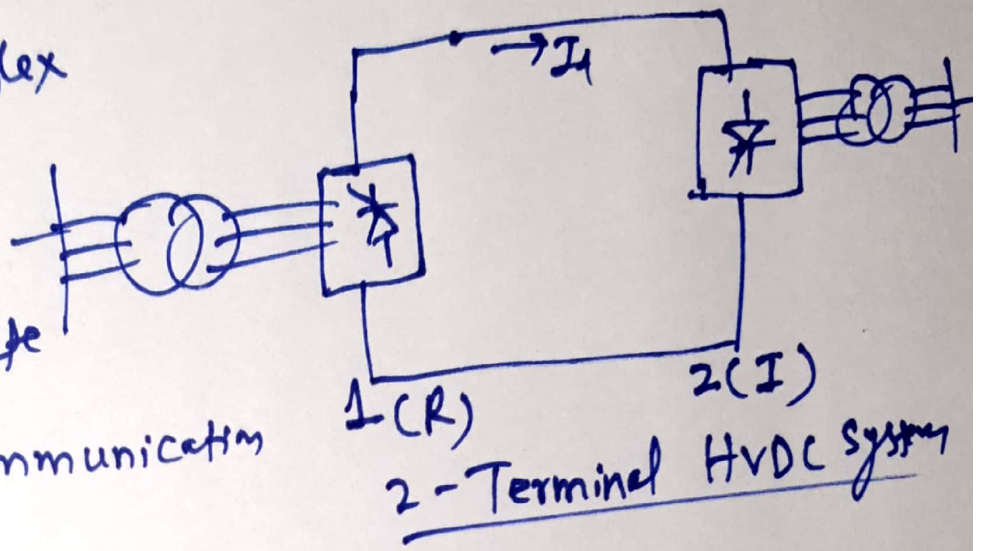


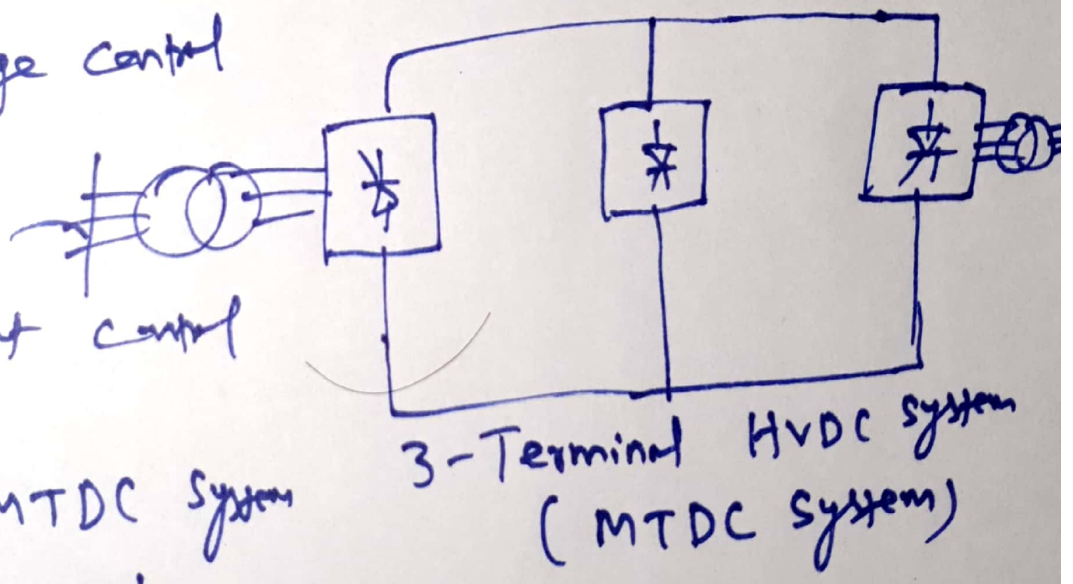
# Multi-Terminal HVDC (MTDC) Systems:

→ An MTDC system is an HVDC system with more than two converter stations.

- More complex
  - Control system is more elaborate
  - Larger communication systems
- R: voltage control



- I: current control
- First MTDC system



Corsica - Italy

→ 1967

World's first UHVDC Txn. link (MTDC system) [ $\pm 800$  kV] is operational bet. Agra & N.E. in India.

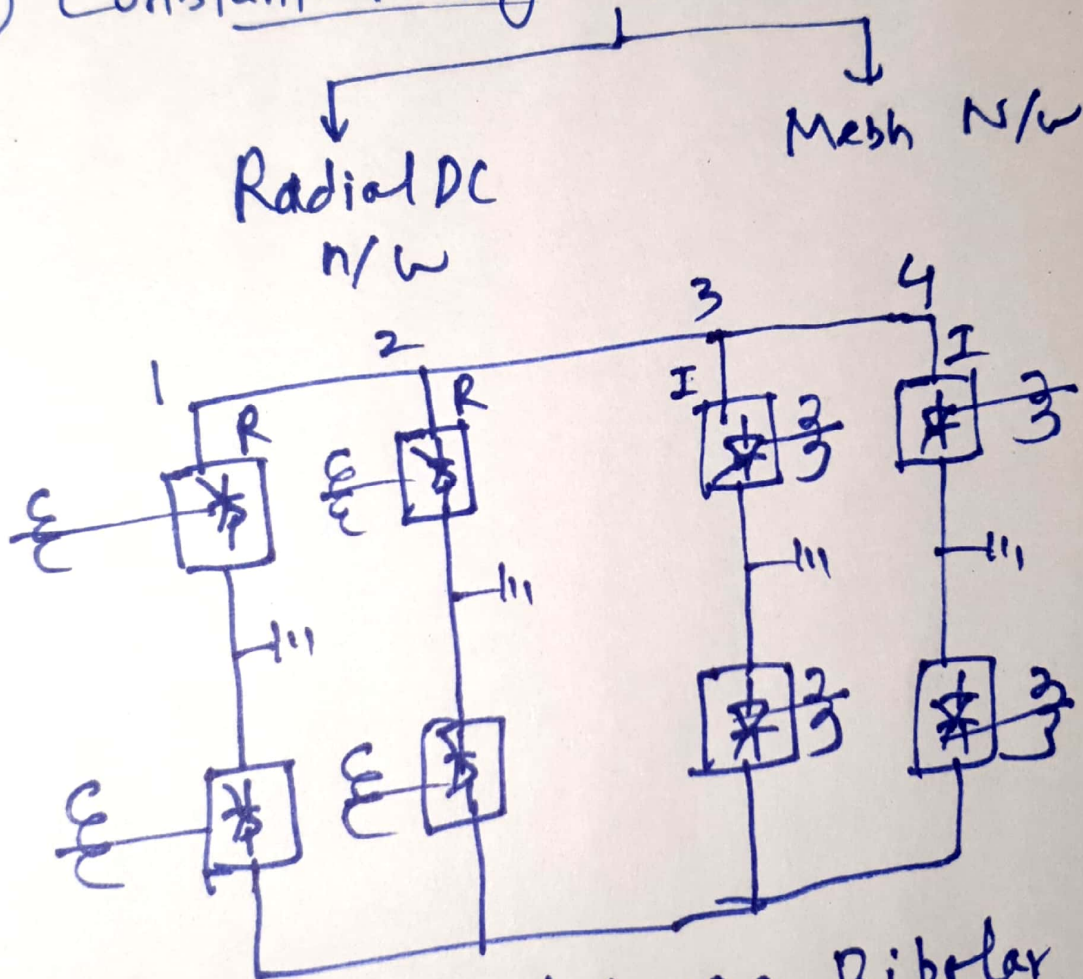
# MTDC Network Configurations:

(2)

Two possible schemes:

- i) Constant-Voltage Parallel-Scheme
- ii) Constant-current Series Scheme.

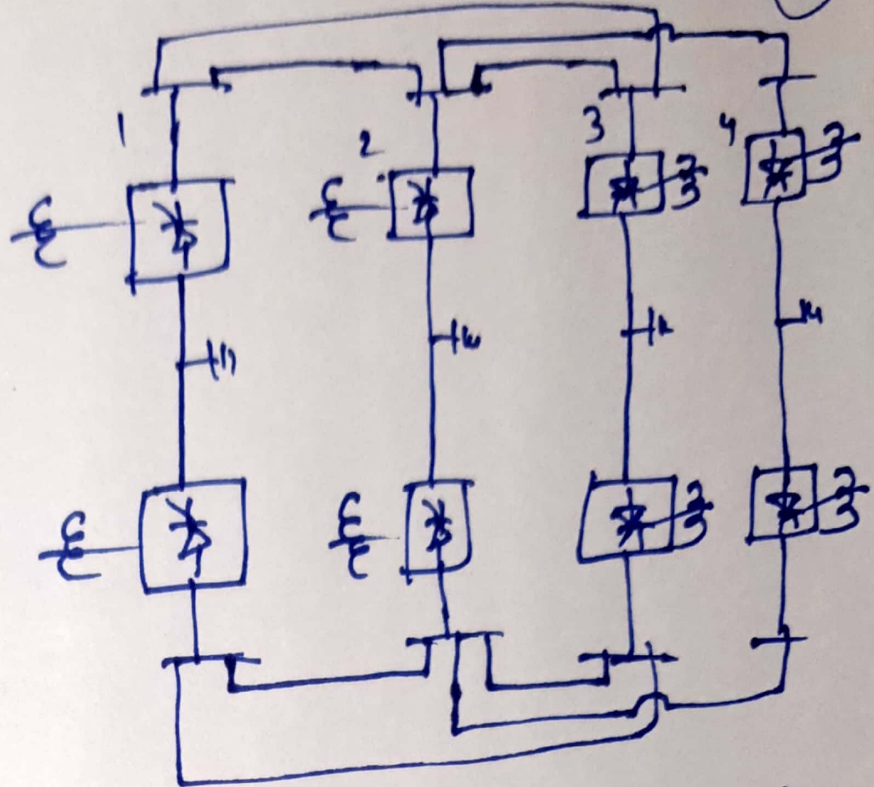
## i) Constant-Voltage Parallel Scheme:



~~Parallel~~ Parallel MTDC Bipolar Scheme with Radial DC N/W

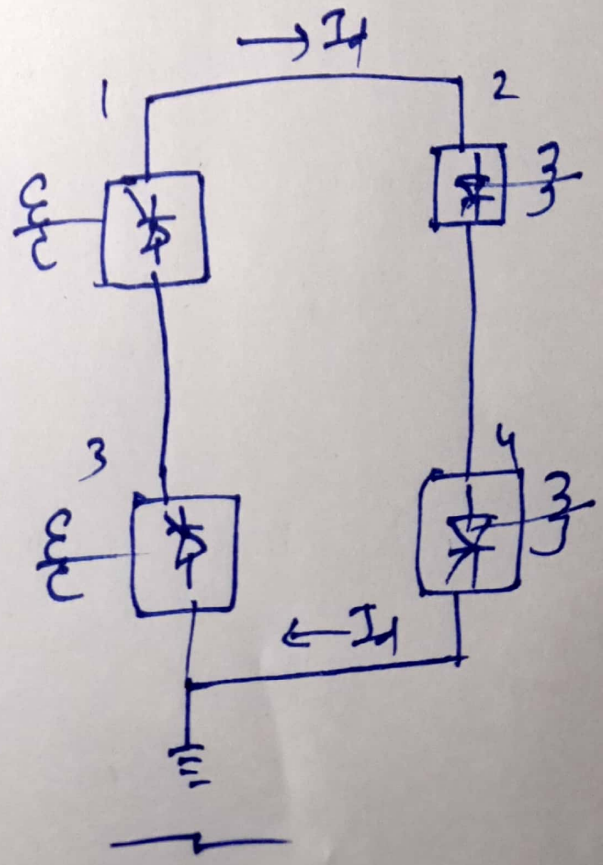
- Four Converter Stations (1, 2, 3, 4) operating in bipolar mode

3



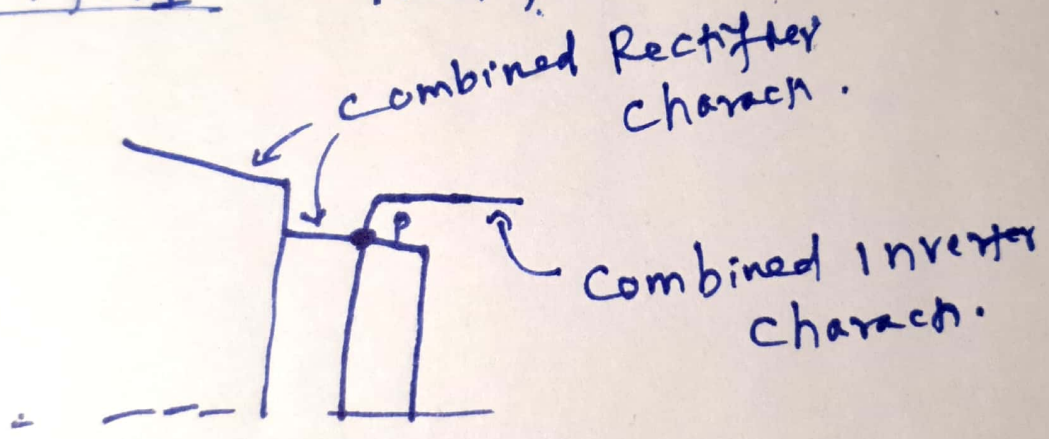
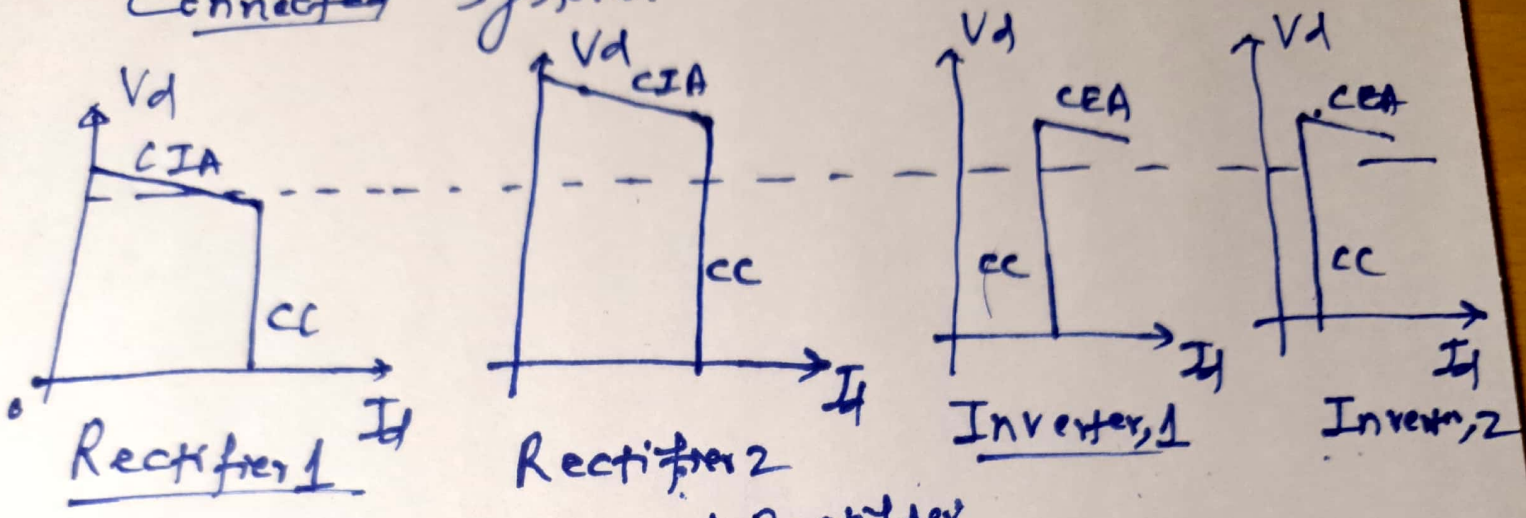
Parallel MTDC Bipolar Scheme with Mesh DC N/w

ii) Constant-current Series Scheme:



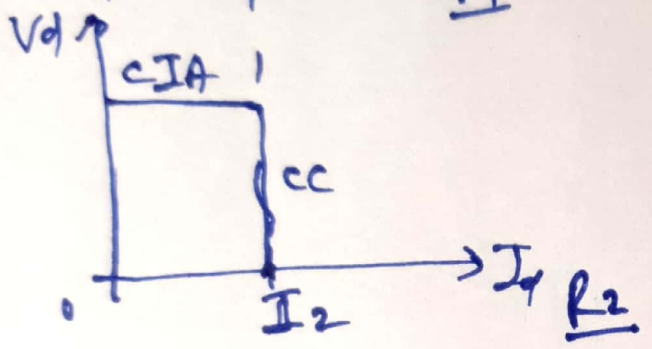
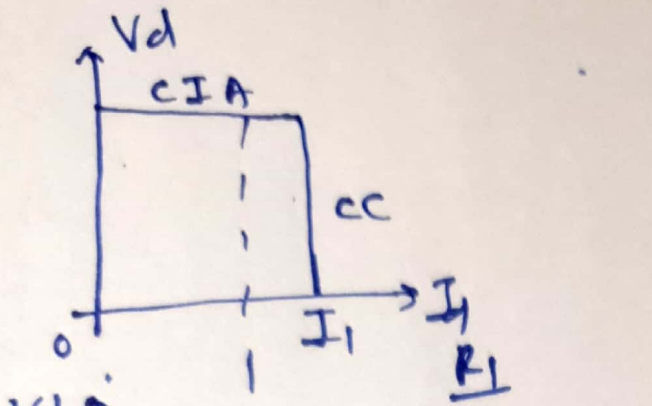
(4)

# Control characteristics of parallel-connected systems:

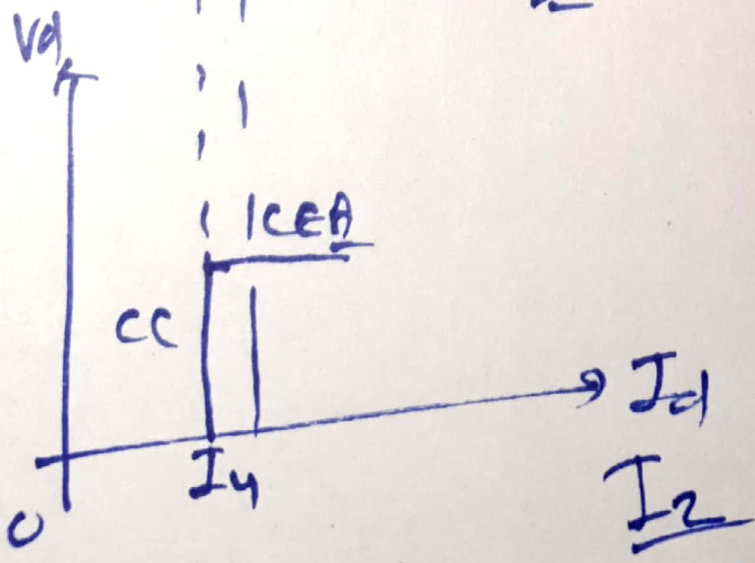
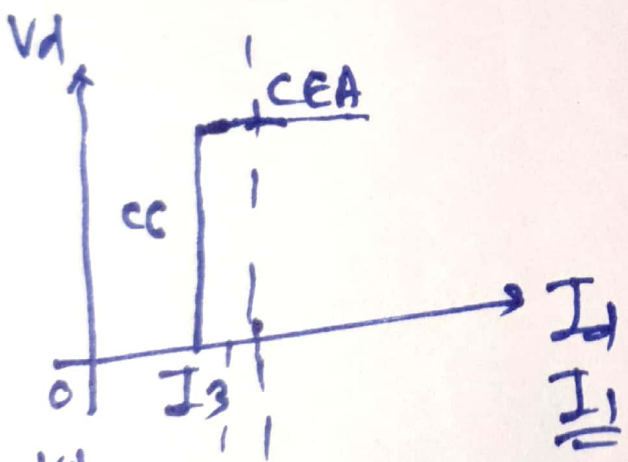
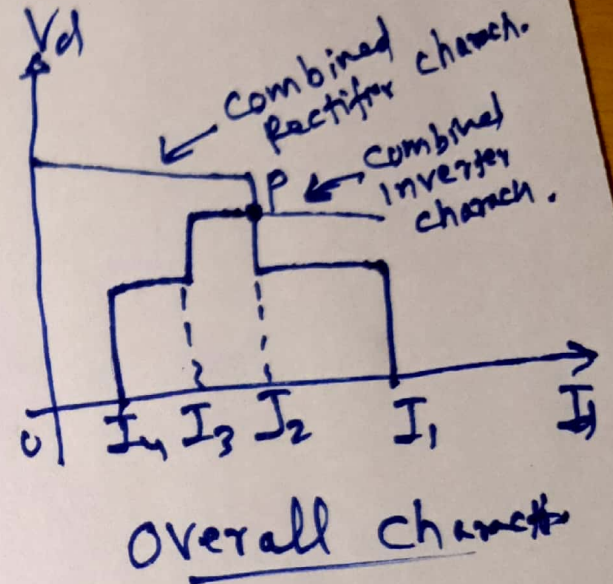


## Overall control characteristics

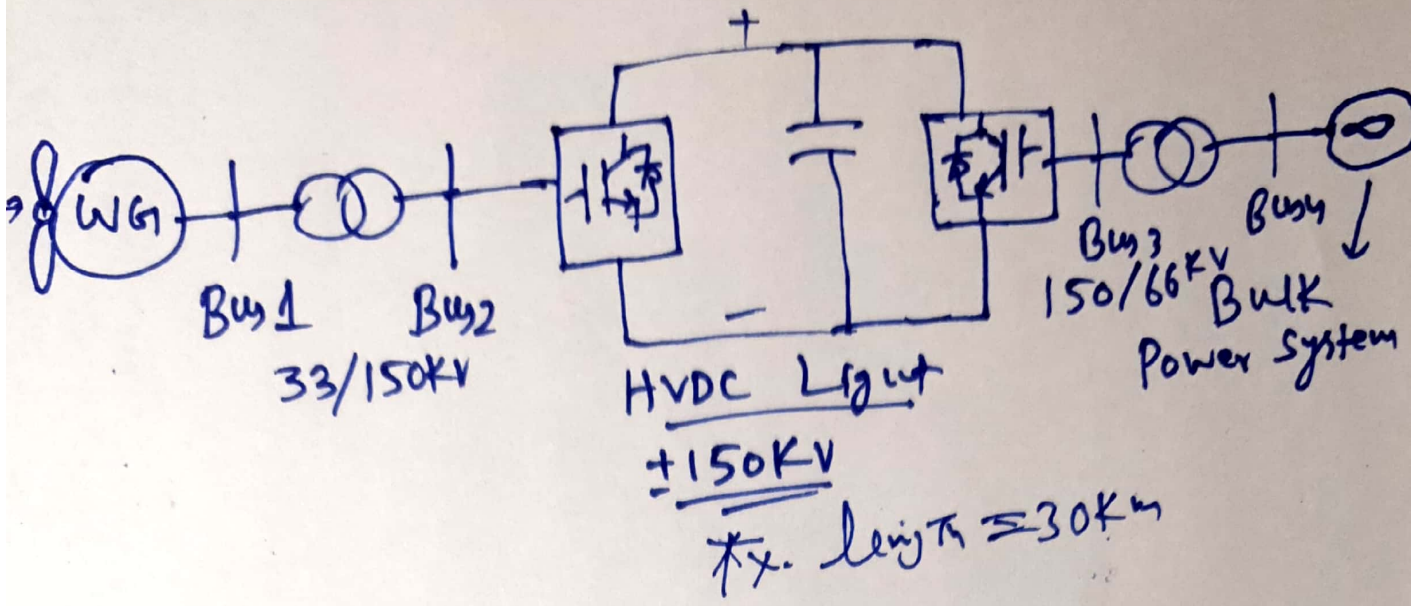
# Control Characteristics of Series-Connected System:



⇒



# HVDC in Wind Power Generation Systems:



## Properties of Offshore wind Power Generation:

Advantages of Offshore wind farm over land wind farm:

- i) Easy to find suitable sites
- ii) Excellent wind profile

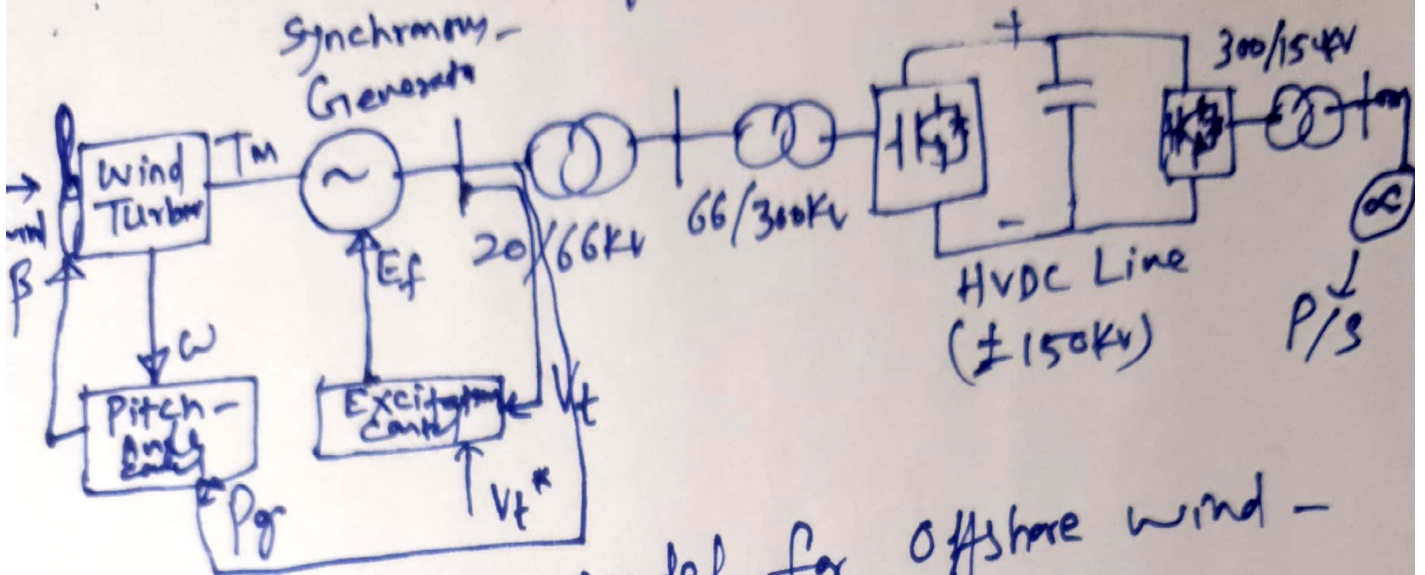
Land wind farm: Wind speed is fluctuating

Offshore wind farm: Considerably flat wind profile

- iii) Offshore wind speed is stronger than land wind speed. Difference of 2.33 m/s on an average → more o/p power

IV) Energy,  $E \propto \omega^3$

$\Rightarrow$  Energy obtained from offshore wind can be possibly 2.4 times that of land wind.



Simplified System Model for Offshore Wind - Power Generation.

