

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B.E. SEMESTER : VIII

### POWER ELECTRONICS ENGINEERING

Subject Name: **POWER ELECTRONICS APPLICATION IN POWER SYSTEM**

Sr. No.	Course Contents	Total Hrs
1.	Introduction: <ul style="list-style-type: none"> <li>Problems of AC transmission systems – Power flow in parallel paths and meshed system – Factors limiting loading capability – Stability consideration – Concepts of power quality – Introduction to IEEE/IEC and other standards related to power quality – Power flow control of an AC transmission line – Basic types of facts controllers – Advantages of FACTS technology.</li> </ul>	6
2.	Shunt Series & Compensation <ul style="list-style-type: none"> <li>Introduction – Concepts of Series &amp; Shunt Compensation – Comparison – Methods of VAR generation – Shunt Compensation Methods – TCR –TSC – Fixed capacitor TCR – STATCOM – Series compensation methods – GCSC – Comparison of TCR and GCSC – TSSC – TCSC – SSSC – Modes of Operation – Voltage Regulator and Phase Angle Regulator (PAR) – Multifunctional FACTS controllers like UPFC and IPFC – basic operating principles and characteristics – Applications.</li> </ul>	12
3.	HVDC <ul style="list-style-type: none"> <li>Introduction – Various possible HVDC configurations – Unipolar and bipolar links – Components of HVDC system like converter, transformer, smoothing reactor, harmonic filter – Control of HVDC system – Rectifier and inverter characteristics – Mode of stabilization – Current control – Voltage control – Modern HVDC system</li> </ul>	12
4.	Renewable Energy Source Interface <ul style="list-style-type: none"> <li>Introduction – Interconnection of Renewable Energy Source to utility grid – Energy storage systems to utility grid &amp; their interconnection – Photovoltaic array interconnection – Wind and small hydro connection.</li> </ul>	10
5.	Optimizing Utility With Power Electronics Systems <ul style="list-style-type: none"> <li>Introduction – Need for improved utility interface – Improved single phase utility interface – Interface for a bidirectional power flow – Improved three phase utility interface</li> </ul>	6
6.	Static Relay <ul style="list-style-type: none"> <li>Introduction – Classification – Basic components – Directional static over-current relay - Static differential relay – Static distance relay</li> </ul>	8

#### References:

- N.G. Hingorani and L. Guygi, “Understanding FACTS Devices”, IEEE Press Publications, 2000
- K. R. Padiyar, “FACTS Controllers in Power Transmission and Distribution”, New Age International (P) Ltd. Publishers.
- Y. H. Song and Allan T. Johns, “Flexible AC Transmission Systems (FACTS)” Institution of Electrical Engineers Press, London, 1999
- N.G. Hingorani and L. Guygi, Concepts and Technology of Flexible AC Transmission System, IEEE Press New York, 2000 ISBN –078033 4588
- T.J.E. Miller, “Static Reactive Power Compensation”, John Wiley & Sons, New York, 1982.
- Ned Mohan, Undeland& Robbins, “Power Electronics: Converters, Applications and Design”, Wiley Publications.
- <http://www.powerstandards.com/tutor.htm>