B.E. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester-VIII

PEC-5-1 : Power Quality and FACTS

P. Pages : 2 **GUG/W/23/14346**

Time : Three Hours * 7 8 8 5 * Max. Marks : 80

Notes :
1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.
5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
6. Answer **five** questions as per internal choice.

1. a) Discuss the following characteristics of power quality issue- **8**

a) Short duration variations

b) Long duration variations

b) Mention two standards specified by IEEE and IEC, for PQ. **8**

OR

2. a) Discuss the following electrical power quality issue with examples- **8**

a) Voltage swell

b) Voltage interruption

b) Describe the significance of CBEMA curve with neat diagram. **8**

3. a) Explain static transfer switch. **8**

b) Analyze the different methods for estimating voltage sag severity due to the disturbance in the power system. **8**

OR

4. a) Explain any one voltage sag mitigation Techniques with necessary circuit diagram and waveform. **8**

b) Briefly explain static transfer switches and fast transfer switches. **8**

5. a) What limits the loading Capability of transmission line? Discuss in detail. **8**

b) Discuss the various categories of FACTS controllers in brief. **8**

OR

6.	a)	What are the possible benefits of FACTS technology?	**8**
	b)	Derive the expression for active as well as reactive power flow in a loss less transmission line? Draw the necessary phasor diagram.	**8**
7.	a)	What are the objectives of Shunt Compensation.	**8**
	b)	Explain FC-TCR and TSC-TCR by covering the following points-	**8**

i) Diagram ii) Operation

iii) V-I characteristics iv) Loss characteristics

OR

8.	a)	Discuss how to prevent voltage instability using shunt compensation connecting at the end of line.	**8**
	b)	Explain how midpoint voltage regulation of a transmission line increases the power transfer capacity of the lines. Also explain how it provides power oscillation damping.	**8**
9.	a)	Explain the operation of GTO-thyristor controlled series capacitor.	**8**
	b)	How can series compensation can be useful for power oscillation damping.	**8**

OR

10.	a)	What are the various approaches to control series compensation.	**8**
	b)	Explain what you mean by variable impedance type and switching Converter type FACT's devices.	**8**

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