

PEC-5-1 - Power Quality and FACTS

P. Pages : 2

Time : Three Hours



GUG/S/25/14346

Max. Marks : 80

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- Notes :
1. Answer **five** questions as per internal choice.
 2. All questions carry equal marks.
 3. Due credit will be given to neatness and adequate dimensions.
 4. Assume suitable data wherever necessary.
 5. Illustrate your answers wherever necessary with the help of neat sketches.
 6. 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.

1. a) Explain the various short duration voltage variations. 8
b) List any five objectives for framing power quality standards. 8

OR

2. a) Mention two standards specified by IEEE and IEC, for PQ. 8
b) With a waveform sketch, explain the terms. 8
 - a) Voltage sag.
 - b) Voltage Interruption
 - c) Voltage swells.
3. a) Demonstrate how voltage sag can be mitigated and list the types to mitigation devices. 8
b) Define Voltage sag. How do you classify the voltage sag? What are the usual causes for producing voltage sag? 8

OR

4. a) Describe in detail about the sag performance evaluation indices. 8
b) Analyze the different methods for estimating voltage sag severity due to the disturbance in the power system. 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
