

2123

M.E. Electrical Engineering (Power System)  
Third Semester  
EE-8304: Power Quality Problems and Mitigation

Time allowed: 3 Hours

Max. Marks: 50

*NOTE: Attempt any five questions. Missing data (if any) can be appropriately assumed.*

x-x-x

**Q1. Explain it briefly.**

- A) What is the meaning of power quality disturbances? (02)
- B) Electrical transients are created due to switching of UPS. Elaborate. (02)
- C) List out the three levels of possible solutions to voltage sag and momentary interruption problems. (02)
- D) State the different between harmonics and transients. (01)
- E) Summarize the main function of DSTATCOM. (01)
- F) When does Ferro resonance occur in a power system? (01)
- G) Mention two standards specified by IEEE and IEC, for power quality. (01)

**Q2.** What are the disturbances coming under the term waveform distortion? Explain each with neat figures. (10)

**Q3.** What is meant by point of common coupling? Generalize the IEEE 519 standard and IEC 61000-3-2 standard with respect to harmonics. (10)

**Q4. A)** What are the various causes of voltage and current harmonics? Explain individual harmonic distortion and total harmonic distortion. (05)

**B)** Determine the  $k$  rating of a transformer required to carry a load consisting of 500 A of fundamental, 200 A of third harmonics, 120 A of fifth harmonics, and 90 A of seventh harmonics. Determine the  $k$  rating of a transformer required to carry a load consisting of 500 A of fundamental, 200 A of third harmonics, 120 A of fifth harmonics, and 90 A of seventh harmonics. (05)

**Q5.** Discuss the effects of harmonics on electrical power components with suitable diagrams. (10)

**Q6. A)** Explain how ferro- resonance transformer to improve the voltage sag performance. (05)

**B)** Illustrate the phenomena of impulsive transients and oscillatory transients. (05)

**Q7.** What are the series and shunt compensators compare their role for power quality improvement? (10)

**Q8.** Explain the following:

- i) Shunt active and Passive filters (10)
- ii) Active series compensators
- iii) Harmonic reduction and standards.

x-x-x