

*NOTE: Attempt any five questions. All questions carry 10 marks.*

x-x-x

- I. Explain the phenomenon of voltage fluctuations. How do voltage fluctuations manifest in an electrical system? What are their typical causes and effects on consumer equipment?
- II. What are the guidelines for measuring and assessing power quality as per IEC and IEEE standards? Discuss key instruments and techniques used in power quality monitoring and importance of real-time data for preventive measures.
- III. What do you mean by capacitive switching transient? How are transients classified based on their origin and duration? Also explain their typical characteristics.
- IV. Describe the affects of lightening-induced transients on electrical systems. How do lightening strikes cause transients and what measures can be taken to protect sensitive equipments from such high-energy surges?
- V. Explain the concept of harmonic resonance. How can harmonic resonance occur in a system? What are the risks associated with resonant conditions? Discuss methods to avoid harmonic resonance.
- VI. Explain in detail harmonic passive filter? Explain the design principle behind passive filters and discuss their effectiveness in reducing specific harmonic orders. What are the limitations of passive filters in modern power systems?
- VII. What is a D-STATCOM? Explain how a D-STATCOM operates to mitigate power quality issues. How does it differ from traditional reactive power consumption methods?
- VIII. Explain the concept of UPQC. How does it combine the functions of both series and shunt compensators and what makes it an ideal solution for power quality improvement?

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