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Reg. No. :

Question Paper Code : 11190

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Second Semester

Electrical Drives and Embedded Control

PX 5252 – POWER QUALITY

(Common to M.E. Power Electronics and Drives)

(Regulation 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the reasons for waveform distortion?
2. List any four standards available on power quality.
3. Write the need for three phase four wire system.
4. Write the importance of power factor in harmonic studies.
5. Define instantaneous reactive power.
6. Draw the structure of shunt compensator and give its principle of operation.
7. What is the need for DSTATCOM?
8. Define active series compensation device.
9. Name any four types of sag mitigation devices.
10. What is the important role of a DVR?

PART B — (5 × 13 = 65 marks)

11. (a) What are harmonics? Explain harmonic distortion due to 12 pulse VFD system with relevant waveforms. (13)

Or

- (b) Explain the following steady state disturbances. (4+3+3+3)
(i) Magnitude (ii) Unbalance (iii) Harmonics and (iv) Flicker.

12. (a) Explain with a suitable compensation scheme, for the nonsinusoidal source supplying linear loads and nonlinear loads. (13)

Or

- (b) Explain in detail the effects of three phase unbalanced source supplying the nonlinear loads. Describe briefly a suitable compensation scheme for the three phase unbalanced source supplying non-linear loads. (13)

13. (a) Discuss with a numerical example, about the classical load balancing problem. (13)

Or

- (b) Explain the various steps involved in the extraction of fundamental sequence component. (13)

14. (a) Explain the reference current generation scheme when the source current is unbalanced and load current is unbalanced and distorted. (13)

Or

- (b) Discuss the operation of DSTATCOM in Voltage control mode. (13)

15. (a) Explain the principle of DVR operation used for sag mitigation. (13)

Or

- (b) Discuss with necessary diagram and waveform about Unified Power Quality Conditioner. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain with a case study the poor voltage power quality due to voltage sag in the 11 kV/440 V three-phase four wire LV distribution systems.

Or

- (b) Explain with a case study, the effects of three phase distorted and unbalanced source supplying six pulse VFD loads connected to three-phase four wire distribution system.