C **190B3** **Total pages: 2**

Register No: …… Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

EIGHTH SEMESTER B.TECH DEGREE EXAMINATION(R), MAY 2024

Electrical and Electronics Engineering

(2020 SCHEME)

Course Code : 20EET434

Course Name : Power Quality

Max. Marks : 100 **Duration:3 Hours**

(Scientific calculator is allowed in the examination hall)

PART A

(Answer all questions. Each question carries 3 marks)

1. Explain the importance of CBEMA curve in power quality.
2. What are the effects of power quality problems? Explain any three effects.
3. Differentiate between electronic ballast and magnetic ballast.
4. Describe briefly how harmonics impact power systems.
5. What is power quality analyzer and state its primary function in electrical systems.
6. Briefly explain the IEC 61000 standard in power quality.
7. Classify the harmonic filters.
8. List the various power conditioning equipments used in power system.
9. Explain the term power factor correction.
10. Discuss various grounding and wiring techniques based on IEEE standards.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Explain long duration voltage variation and the reasons for it. 9

    b) Explain the classification of long duration voltage variation. 5

OR

12. Explain in detail about transients and short duration voltage variation related to power quality with neat illustrations. 14

MODULE II

13. With neat power flow diagrams, explain the generation of harmonics in electrical system. 14

OR

14. (a) Describe the role of SMPS in generating harmonics in distribution systems. 6
    (b) Explain the harmonic source content due to arcing and saturable devices. 8

MODULE III

15. A three-phase purely resistive load of 50 kW rating is supplied directly from a 50 Hz three-phase 415 V (phase-to-phase) bus. At the time of measuring, the load was consuming 41.5 kW 14

and the voltage waveform contained 11 V of negative-sequence fifth harmonic and 8 V of positive-sequence seventh harmonic. Assuming that the load resistance varies with the square root of the harmonic order h, calculate the THD and TDD indices at the point of connection.

OR

16. a) Explain how harmonic spectrum analyser is used in power quality and the measurements involved in it? 10

b). Differentiate between displacement power factor and total power factor 4

MODULE IV

17. (a) What are hybrid filters and state its significance? 4
(b) Explain the different types of hybrid filters with neat diagrams. 10

OR

18. (a) Explain a single tuned low pass filter with neat circuit diagram. 4
(b) Explain the procedure for designing a low pass filter and mention its advantages and disadvantages. 10

MODULE V

19. (a) Explain the operating conflicts that result in the power quality problems of a distributed system. 7
(b) What are the main power quality issues affected by DG? 7

OR

20. Explain the power quality issues of grid connected renewable energy sources. 14

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