Reg. No.															

B.Tech. DEGREE EXAMINATION, MAY 2024
Sixth Semester

18EEE314T – POWER QUALITY
(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:
(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO
1. An undervoltage is _____in the RMS AC voltage to _____than_____at the power frequency for duration_____ (A) Increase, less, 110%, lesser than 1 min (B) Increase, less, 90%, longer than 1 min (C) Decrease, greater, 110%, longer than 1 min (D) Decrease, less, 90%, longer than 1 min	1	2	1	1
2. Lightning and tree striking on a live conductor is an example of _____power quality issue. (A) Voltage sag (B) Voltage swell (C) Interruption (D) Surge	1	1	1	1
3. Continuous and rapid variations in the load current magnitude which causes voltage variations_____ (A) Voltage sag (B) Voltage distortion (C) Harmonics (D) Flicker	1	1	1	1
4. CBEMA curve is related to _____ (A) Sensitive equipment (B) Computer equipment (C) Electronics equipment (D) Lighting equipment	1	1	1	1
5. Area of vulnerability is also called as (A) Equipment voltage sag immunity and equipment voltage sag susceptibility limit (B) Equipment voltage lag immunity and equipment voltage lag susceptibility (C) Equipment current lag immunity and equipment current lag susceptibility limit (D) Equipment current sag immunity and equipment current sag susceptibility limit	1	1	2	1
6. Which one is the short time reduction in the RMS voltage between 0.1 to 0.9 p.u for a duration of 0.5 cycle to 1 minute? (A) Voltage distortion (B) Voltage sag (C) Voltage degradation (D) Voltage swell	1	2	2	1

7.	The standard for voltage sag indices is given in _____ (A) IEEE 1564 (B) IEEE 1433 (C) IEE 519 (D) IEEP 1409	1	1	2	1
8.	The duration of the momentary sag is _____ (A) 0.5-30 cycles (B) 30cycles -3 secs (C) 3 sec-1 minute (D) > 1 minute	1	1	2	1
9.	THD stands for (A) Total hysteresis discharge (B) Total harmonic distortion (C) Total harmonic discharge (D) Total hysteresis distortion	1	1	3	1
10.	What is the condition for occurrence of harmonics? (A) Integer multiple of frequency in supply system (B) Geometrical mean of frequency in supply system (C) Variation in voltage (D) Flicker	1	1	3	1
11.	When analyzing a non-sinusoidal waveform, it is important to know the _____ of the harmonic components present. (A) Magnitude and phase angle (B) Phase angle only (C) Magnitude only (D) Firing angle only	1	1	3	1
12.	Symmetrical waveforms will contain _____numbered harmonics. (A) Both odd and even (B) Neither odd and even (C) Only even (D) Only odd	1	1	3	1
13.	Low frequency analyzers are sometimes called as _____ (A) Harmonic analyzer (B) Disturbance analyzer (C) Power frequency disturbance analyzer (D) Spectrum analyzer	1	1	4	1
14.	The monitoring objectives determines choice of _____ (A) Triggering thresholds (B) Monitoring equipments (C) Quality of service (D) Compensation devices	1	1	4	1
15.	Harmonic analyzer uses which of the following analysis to identify the predominant harmonic component_____ (A) Frequency domain analysis (B) Time domain analysis (C) Frequency-time domain analysis (D) Power domain analysis	1	1	4	1
16.	The permissible THD in a power system is _____ (A) 5% (B) 10% (C) 15% (D) 20%	1	1	4	1
17.	_____are advanced data acquisition devices for capturing, storing and presenting short-duration, sub cycle power system disturbances (A) Harmonic analyzer (B) Transient-disturbance analyzers (C) Oscilloscope (D) Data loggers and chart recorders	1	1	5	1

18.	_____shows the pulse-width modulation waveform of the voltage input to an adjustable speed AC motor. (A) Harmonic analyzer (B) Transient disturbance recorders (C) Oscilloscope (D) Data loggers and chart recorders	1	1	5	1
19.	Harmonics from DG come from _____and some _____machines. (A) Inverters, synchronous (B) Transformers, synchronous (C) Rectifiers synchronous (D) Rectifiers asynchronous	1	1	5	1
20.	The accelerating increase in the amount of _____generation interconnection with the utility distribution system has introduced new concerns for voltage regulations issues. (A) Wind power (B) Tidal power (C) Solar photovoltaic (D) Thermal power	1	1	5	1

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

		Marks	BL	CO	PO
21.	List out any four standards available in power quality.	4	1	1	1
22.	Define the following terms (i) Inter harmonics (ii) Voltage flicker	4	1	1	1
23.	What is the condition at which an interruption occurs?	4	2	1	1
24.	Name the frequently used voltage sag indices.	4	2	2	1
25.	Mention the harmonic effects on electronic devices and loads. Give examples.	4	2	4	1
26.	What are the requirements of monitoring a harmonic distortion?	4	2	5	1
27.	Write about the power quality issues in grid connected wind energy conversion system.	4	1	5	1

PART – C (5 × 12 = 60 Marks)
Answer **ALL** Questions

		Marks	BL	CO	PO
28. a.	Discuss the sources and effects of different categories of long duration variations.	12	1	1	1
	(OR)				
b.	How do power quality issues affect electrical systems and society? Discuss causes, consequences and mitigation strategies.	12	1	1	1

29. a.	Describe the operational principles of dynamic voltage restorer in mitigating voltage sags.	12	2	2	1
	(OR)				
b.i.	Discuss any two voltage sag mitigation methods with necessary circuit diagram and waveforms.	8	2	2	1
ii.	Explain how voltage sag caused due to motors.	4	2	2	1
30. a.	Explain the differences in harmonic sources between industrial operations and commercial loads. Assess the respective impacts on power system and equipment, and discuss challenges and mitigation strategies for each.	12	3	3	1
	(OR)				
b.	Explain the following terms (i) Harmonic distortion (ii) Current distortion (iii) Voltage distortion	4 4 4	1	3	1
31. a.	Bring out the significance of power quality monitoring. What are the important power quality monitoring objectives?	12	2	4	1
	(OR)				
b.	Explain in detail about (i) Spectrum analyzer (ii) Flicker meter	6 6	1	4	1
32. a.	Enumerate the advantages of distributed generation and elaborate on one specific distributed technology, including a neat sketch to illustrate its functioning.	12	2	5	1
	(OR)				
b.	Outline the methodology involved in conducting a site study for distributed generation, emphasizing its significance in facilitating successful implementation.	12	3	5	1

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