

Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 8006**

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – MAY / JUNE 2024

Sixth Semester

Electrical and Electronics Engineering

U19EEV12 – POWER QUALITY IN POWER SYSTEMS

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels	K1 – Remembering	K3 – Applying	K5 - Evaluating
(KL)	K2 – Understanding	K4 – Analyzing	K6 - Creating

**PART – A**

Q.No.	Questions	(10 x 2 = 20 Marks)		
		Marks	KL	CO
1.	Define Power Quality.	2	K1	CO1
2.	Explain the different types of voltage variations.	2	K1	CO1
3.	What is voltage sag?	2	K1	CO2
4.	How voltage swell can be mitigated?	2	K2	CO2
5.	What is Fast Fourier transformation?	2	K1	CO3
6.	What are harmonics in power systems?	2	K1	CO3
7.	Differentiate between active filters and passive filters?	2	K2	CO4
8.	Differentiate between shunt and series filters?	2	K2	CO4
9.	What is meant by Power Quality Monitoring?	2	K2	CO5
10.	What is the application of power disturbance analyzers?	2	K2	CO5

**PART – B**

Q.No.	Questions	(5 x 13 = 65 Marks)		
		Marks	KL	CO
11. a)	Explain in detail the significance of the CBEMA curve and the information conveyed by the CBEMA curve. Also, discuss the limitations of this curve.	13	K2	CO1
(OR)				
b)	Using suitable waveforms, explain waveform distortions and power frequency variations. Also, discuss the different types of waveform distortions.	13	K2	CO1

12.	a)	What is voltage sag severity? Discuss the approaches used for estimating the voltage sag severity.	13	K2	CO2
		(OR)			
	b)	Using a suitable example, explain Thevenin's equivalent source approach for calculating the voltage sag in a faulty power system.	13	K2	CO2
13.	a)	Show that a square wave of unit magnitude can be presented as the sum of sin wave components.	13	K3	CO3
		(OR)			
	b)	Discuss the features of the different tools used for harmonic analysis: a) Fourier series and coefficients, b) Fourier transforms, c) Discrete Fourier Transform, d) Fast Fourier transform.	13	K2	CO3
14.	a)	At the point of common coupling, the 1 pu 50 Hz sine wave supply system contains the 3rd and 5th harmonic components. Design a passive filter to eliminate the 3rd and 5th harmonic from the system.	13	K3	CO4
		(OR)			
	b)	What are shunt and series active filters? Using suitable diagrams, explain their operation. Also, explain how they eliminate the harmonics from the system.	13	K3	CO4
15.	a)	Discuss the approach adopted to monitor power quality events, such as harmonics, disturbance, etc., in the power system.	13	K2	CO5
		(OR)			
	b)	What are flicker meters? Using a suitable diagram, explain the operation of the flicker meters.	13	K2	CO5

### PART – C

Q.No.	Questions	(1 x 15 = 15 Marks)		
		Marks	KL	CO
16.	a) What are smart grids? Discuss the importance of monitoring and mitigating the power quality events in the smart grid operations. Also, discuss how smart grids help monitor the power quality events and their mitigation.	15	K3	CO5
	(OR)			
	b) Discuss the different power quality issues arising in the power systems due to integrating renewable energy sources into the power system. Also, briefly discuss the mitigation of harmonic and voltage disturbances in them.	15	K3	CO5