Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S) Exam (FT / PT) April 2025 (2019 Scheme)

Course Code: EET436

Course Name: POWER QUALITY

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

PART A

Answer all questions, each carries 3 marks. Marks

1	List the major sources of power quality problems.	(3)
2	Differentiate between voltage sag and voltage swell.	(3)
3	Define Fourier transform and its inverse transform.	(3)
4	Why even harmonics are normally absent in the power converters?	(3)
5	Find the harmonic distortion of a sinusoidal waveform with the following amplitudes of harmonics: fundamental=3.08V, 3^{rd} harmonic=0.308V, 5^{th} harmonic=0.159V, 7^{th} harmonic=0.090V and 9^{th} harmonic=0.0487V	(3)
6	Describe the aspects of power quality assessment covered by IEC 61000.	(3)
7	Draw any two configurations of hybrid passive filters.	(3)
8	Explain the configuration of a shunt active power filter.	(3)
9	List three power quality issues in a grid-connected renewable grid.	(3)
10	Explain the necessity for grounding in electrical systems.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Discuss the source and effects of different categories of short-duration voltage variations that affect the power quality.	(8)
	b)	Discuss the causes and effects of DC offset and Notching.	(6)

OR

12 a) Explain any five types of power quality disturbances and also explain the characteristics of each disturbance (10)

b) Summarize the impact of poor power quality on utility and consumers. (4)

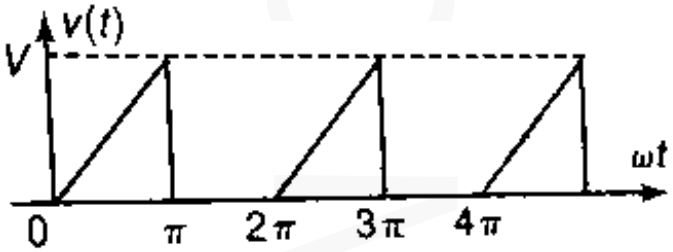
Module II

13 a) How do power electronic devices in industrial applications affect harmonic levels in a power system? Explain with an example with associated waveforms. (9)

b) Differentiate between the application of Fourier transform and Fourier series in harmonic analysis. (5)

OR

14 a) Obtain the Fourier series expansion of the periodic waveform shown in the figure below. (14)



Module III

15 a) Explain the following power quality indices with equations (8)

1) C-message weight 2) TIF 3) Distortion Factor 4) displacement power Factor

b) Write a short note on power quality monitoring objectives. (6)

OR

16 a) Determine the total power factor when the displacement between voltage and current is 25°, and the THD is 49% (8)

b) Describe any two instruments that can be used for harmonic analysis. (6)

Module IV

17 a) Explain load compensation using DSTATCOM (6)

b) What are the main components and operational principles of a DVR? Explain the concept of sag compensation using DVR. (8)

OR

18 a) Describe the general structure of UPQC and its working. (7)

b) Illustrate the design steps of a passive harmonic filter with equations. (7)

Module V

19 a) Explain the major power quality issues associated with grid-connected renewable energy resources. (6)

b) Explain various solutions to wiring and grounding problems (8)

OR

20 a) With relevant sketches, explain an active power factor corrector and its control. How does it differ from a passive power factor corrector? (8)

b) List out the advantages and disadvantages of boost APFC. (6)

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