GUJARAT TECHNOLOGICAL UNIVERSITY
BE –SEMESTER-VIII EXAMINATION- SUMMER-2020

Subject Code: 2180911   **Date:02/11/2020**

Subject Name: Power Quality and Management

Time:02.30 pm to 05.00 pm   **Total Marks: 70**

Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

			MARKS
Q.1	(a)	Define the power quality as per IEEE standards and list out all the power quality issues.	03
	(b)	Define the following terms with suitable figures/waveforms. 1. Crest Factor 3. Distortion 2. Grounding 4. Bonding.	04
	(c)	Explain various sources of Voltage Sags and Voltage Swell.	07
Q.2	(a)	Explain in brief about Isolation Transformer,	03
	(b)	Give examples of Transient models and Transient responses and explain any one in brief.	04
	(c)	List types and causes of transients and explain capacitor bank switching.	07
		OR	
	(c)	Discuss the various DG technologies in brief.	07
Q.3	(a)	Explain cable shielding to minimize Electromagnetic Interference.	03
	(b)	Find out value of capacitor in KVAR to improve the power factor of a 130KW Induction Motor from 0.8 to 0.9.	04
	(c)	List the methods for power factor improvement and explain application of Synchronous Condensers.	07
		OR	
Q.3	(a)	Describe an effect of EMI on power quality.	03
	(b)	Give the name of various Electromagnetic Interference terminologies and describe CMRR and TMN.	04
	(c)	Explain various methods to mitigate EMI in detail.	07
Q.4	(a)	Differentiate Grounding and Bonding.	03
	(b)	Write the function of essential elements of a grounded electrical power system.	04
	(c)	Explain how an earth resistance tester is used to test the resistance between the ground grid and earth.	07
		OR	
Q.4	(a)	List out the various instruments used for power quality measurements.	03
	(b)	Explain importance and application of True RMS meter.	04

(c) Explain number of test locations and test duration for power quality measurement. **07**

Q.5 **(a)** Load current of a non-linear load has following components. RMS value of fundamental, 3rd, 5th, and 7th harmonics are 60A, 30A, 20A and 10A respectively. Find Individual Harmonic Distortion as per IEEE standard. **03**

(b) Find the total harmonics distortion of a voltage waveform with the following harmonic frequencies by finding each Individual Harmonic Distortions. **04**

1. Fundamental $V_1 = 115V$
2. 3rd harmonic $V_3 = 5V$
3. 5th harmonic $V_5 = 3V$
4. 7th harmonic $V_7 = 2V$
5. 9th harmonic $V_9 = 1V$

(c) Explain causes of Voltage and Current Harmonics. **07**

OR

Q.5 **(a)** Define and explain the term" Distribution Generation". **03**

(b) Draw the ITIC graph and explain its several regions. **04**

(c) List and explain various power quality issues affected by DG. **07**

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