

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2170910**Date: 15/11/2018****Subject Name: Power Quality and Management****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

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

- Q.1** (a) Define: (1) Bonding (2) Flicker (3) Distortion **03**
(b) State the importance of ground rings. **04**
(c) Analyze the transient response when DC voltage is suddenly applied to circuit contains resistance and capacitance in series. **07**

- Q.2** (a) Identify the three regions in graph provided by Information Technology Industry Council (ITIC) for guiding the voltage tolerance limit. **03**
(b) Discuss the responsibilities of consumers and suppliers of electrical power? **04**
(c) Explain the use of isolation transformer as a cure of low frequency disturbances. **07**

OR

- (c) State the effect of harmonics on AC motor. **07**

- Q.3** (a) Find the total harmonic distortion of a voltage waveform with the following harmonic frequency make up: **03**
Fundamental = $V_1 = 114$ V
3rd harmonic = $V_3 = 4$ V
5th harmonic = $V_5 = 2$ V
7th harmonic = $V_7 = 1.5$ V
9th harmonic = $V_9 = 1$ V
(b) Illustrate the phenomenon to cause transients in power system due to atmospheric condition. **04**
(c) Explain how static VAR compensator improves the power factor of system. **07**

OR

- Q.3** (a) Explain the formation of electrolytic reactions due to ground grids. **03**
(b) 5-MVA transformer is loaded to 4.5 MVA at a power factor of 0.82 lag. Calculate the leading kVAR necessary to correct the power factor to 0.95 lag. **04**
(c) Discuss the signal reference ground method to provide low impedance plane for sensitive load. **07**

- Q.4** (a) Define the term: Electromagnetic interference susceptibility **03**
(b) State the advantage of power factor correction. **04**
(c) Illustrate the process of voltage levels build up on surface due to static electricity. **07**

OR

- Q.4** (a) Define the terms related to electromagnetic interference: **03**
(1) Filter (2) Shielding (3) Bandwidth
(b) Explain in detail about the triboelectricity. **04**
(c) Explain how shielding is used to mitigate the EMI. **07**

- Q.5 (a) A triboelectric material with a capacitance of $1 \mu\text{F}$ is charged to a potential of 20,000 V. What is the value of the resistance required to discharge the material to a safe voltage of 100 V in 1 sec? **03**
- (b) How oscilloscope is used to measure the repetitive high frequency waveforms? **04**
- (c) Explain the use of true RMS meter. **07**

OR

- Q.5 (a) For what purpose, harmonic analyzers are used. **03**
- (b) Explain how filters are used to mitigate the EMI. **04**
- (c) Illustrate the static protective workstation setup showing the use of wrist strap, a shoe strap and an antistatic floor mat. **07**

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