

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2022****Subject Code:3170921****Date:16-01-2023****Subject Name:Power Quality and FACTS****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.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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|------------|-----|---|-----------|
| Q.1 | (a) | Explain displacement power factor and true power factor with necessary equation. | 03 |
| | (b) | Define flicker. List reasons responsible for flicker. | 04 |
| | (c) | Explain various power quality issues due to distributed generation. | 07 |
| Q.2 | (a) | What is THD? According to IEEE 519, state various voltage and current THD? | 03 |
| | (b) | What are the types of FACTS controllers? Explain in brief. | 04 |
| | (c) | What do you mean by order of harmonics? When even order harmonics will be present in the system? Explain its effect on induction motor. | 07 |
| | | OR | |
| | (c) | Discuss the effect of harmonics on AC Motors Drives. | 07 |
| Q.3 | (a) | State the importance of power factor in industry as per power quality study. | 03 |
| | (b) | Discuss in brief, about the various applications of SVCs. | 04 |
| | (c) | Explain different Static Var Compensators. | 07 |
| | | OR | |
| Q.3 | (a) | What is harmonics? Explain with necessary waveforms. | 03 |
| | (b) | What are the major sources of current harmonics? | 04 |
| | (c) | Explain improvement in power factor using static VAR compensator. | 07 |
| Q.4 | (a) | Explain application of synchronous condensers. | 03 |
| | (b) | Discuss in brief, about harmonics in a Thyristor-Controlled Reactor. | 04 |
| | (c) | Explain the schematic diagram and working principle of a STATCOM. | 07 |
| | | OR | |
| Q.4 | (a) | Discuss Harmonic Analyzer. | 03 |
| | (b) | Write short note on true RMS meter. | 04 |
| | (c) | What are CBEMA and ITIC graphs? Draw and discuss the ITIC graph in detail. | 07 |
| Q.5 | (a) | What are the various instruments used for power quality measurements. | 03 |
| | (b) | Explain single-tuned filter for harmonic reduction. | 04 |
| | (c) | Explain working of TSC- TCR with neat circuit diagram and waveform. | 07 |
| | | OR | |
| Q.5 | (a) | Define: 1.Linear Loads 2.Inrush Current 3.Voltage Swell | 03 |
| | (b) | Explain the features of flicker meters. | 04 |
| | (c) | Describe the objectives and procedures for performing power quality monitoring. | 07 |