

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2023****Subject Code:3170922****Date:01-12-2023****Subject Name: Smart Grids****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) Compare the smart grid and conventional grid system. | 03 |
| | (b) Enlist types of loads and load models | 04 |
| | (c) Discuss generalized smart grid architecture with appropriate diagram. | 07 |
| Q.2 | (a) Enlist types of generators and mathematical models for the same. | 03 |
| | (b) Describe functional block diagram of a smart metering. | 04 |
| | (c) Explain Energy management system (EMS) in detail. | 07 |
| | OR | |
| | (c) Elaborate different communication protocols to be used in smart grid architecture. State specific application of each. | 07 |
| Q.3 | (a) Discuss the term Unit commitment in your words | 03 |
| | (b) Discuss Economic Dispatch in your words | 04 |
| | (c) Given that a home distribution system to be upgraded with DC microgrid for integrating solar PV and battery storage. Discuss DC microgrid architecture and all its components with appropriate diagram for the same. | 07 |
| | OR | |
| Q.3 | (a) What is islanding? Explain the need and benefits of islanding | 03 |
| | (b) Compare distributed renewable energy generators and fossil fueled generators based on reliability. | 04 |
| | (c) Explain the concept of wide area monitoring system (WAMS) | 07 |
| Q.4 | (a) Explain the SCADA system and their limitations | 03 |
| | (b) Describe the advantage and disadvantage of distributed generations. | 04 |
| | (c) Explain the operational feature of phasor management Unit (PMU) | 07 |
| | OR | |
| Q.4 | (a) Explain in brief: Automatic meter reading | 03 |
| | (b) Describe the role of load dispatch centers in smart grid operations. | 04 |
| | (c) Discuss concept of “self-healing” and elaborate generalized fault detection and self healing strategy at feeder level with appropriate diagram. | 07 |
| Q.5 | (a) Discuss the term “smart grid” in your words | 03 |
| | (b) What are the challenges of demand side management of smart grid. | 04 |
| | (c) Explain Wi-Max based communication and wireless mesh network. | 07 |
| | OR | |
| Q.5 | (a) Discuss the term “microgrid” in your words | 03 |
| | (b) Explain the necessity of cyber security for smart grid operations | 04 |
| | (c) Given that, Electric Vehicle parking lot with V2G and G2V facility at office area. | 07 |
| | <ul style="list-style-type: none"> • Discuss the microgrid model with appropriate diagram and strategy for operation and management of the same. | |
