APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Scheme for Valuation/Answer Key
Scheme of evaluation (marks in brackets) and answers of problems/key
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
Course Code: EE403
Course Name: DISTRIBUTED GENERATION AND SMART GRIDS

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 5 marks.   Marks

1   Any four comparison(5mark)   (5)

2   Equations real and reactive powers (2mark)+ explanation (3 mark)   (5)

3   Smart meter   (2+3)

- Meter that has metering as well as communication abilities

Features

- Provides data on energy usage to consumer

- Sends data to utility fro peak-load requirements, load factor control etc.

- Better pricing information

- Tariff options, DR rates, smart thermostat, remote connect/disconnect of users, appliance control etc.

4
- Capability to regulate energy usage based on the information on dynamic pricing   (5)

- Can respond to utility signals to improve peak management capability

- Automatic adjustments to respond to emergency situations

- Consumer can override all formerly programmed instructions from smart grid if necessary

- Can shift power usage to optimal time for DGs

5   Diagram-2, Explanation-3(Application requirements, Sensors, Actuators, Controllers, Media, standards and protocols)   (5)

6
- AMI-link between grid and consumer   (5)

- Monitoring and control

- Market participation

- Smart meters are employed

- Remote connection

- Automatic data communication

- Helps in self-healing

7   Equation – 2, explanation -3   (5)

8   Applications of cloud computing in smart grid   (5)

PART B
Answer any two full questions, each carries 10 marks.

9   AC microgrid diagram(5mark), Explanation(5mark)   (10)

10   Block diagram and Operation of Single-Shaft and Split-Shaft Microturbines   (10)
     (5+5)

11   a)   Components of a Ultra capacitor(3). Advantages and disadvantages (2).   (5)

     b)   Block diagram of flywheel energy storage (FES) system (3)+ working (2)   (5)

PART C
Answer any two full questions, each carries 10 marks.

12
- NIST Smart grid architecture figure
- Consumer domain, Markets domain, Utility domain, Operations domain, Generation domain, Transmission domain, Distribution domain
- NIST diagram (4) + Domains (3) + Explanation (3)

13   a)
- Definition of Islanding (2)
- Fast separation from the faulted feeder, Prevention of spurious separation, Non-fault separation, Separation from exporting Microgrids, Re-synchronisation (3)

     b)   **Load shaping** – Modification of load shape by decreasing the consumption during peak period and increasing the consumption during off-peak period (3)

     Advantages (2)
- Flattening of load profile
- Improvement of efficiency
- Avoid the effects of intermittent generation
- Better use of base generating stations

14   Load curve   --(4)

     Maximum demand = 40MW   ---------------------(1)

     Units generated per day = 655×10^3 kWh   -------- (1)

     Average load = 27.29×10^3 kW   -----------------(2)

     Load factor = 68.2%   -----------------------------(2)

PART D
Answer any two full questions, each carries 10 marks.

15   Feeder Automation   -----(3)

           Components   ------(7)

- Remote Fault Indicators
- Smart Relays
- Automated Feeder Switches and reclosers
- Automated Capacitors
- Automated Voltage Regulators
- Automated Feeder Monitors
- Transformer Monitors

16   a)   Diagram 3 marks, explanation- 4 marks

      b)   Advantages – 3 marks

17   List- 3 marks, explanation-7 marks

          (Sustained interruptions, Voltage regulation, Harmonics, Voltage sag, Operating conflicts, power quality disturbances)

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