Nirma University

Institute of Technology

Semester End Examination (IR), December - 2023

B. Tech. in CL / CH / ME / CSE, Semester-VII

2EEOE03-O Introduction to Smart Grid

Roll/ Exam No. | Supervisor's Initial With Date

Time: 3 Hours | Max. Marks: 100

Instructions: -

1. Attempt all questions.
2. Use section-wise separate answer book.
3. Figures to right indicate full marks.
4. Draw neat sketches wherever necessary.
5. Assume suitable data wherever necessary.
6. Notations used have their usual meaning.

SECTION- I

Q-1 (A)	CO1_L3	The smart grid is often discussed within the context of grid modernization. How important is modernization compared to a "smart" grid theme, in your opinion? What are its components?	[6]
(B)	CO1_L2	Compare conventional grid with 21st century smart grid.	[6]
(C)	CO1_L3	Explain basic structure of conventional power system with various specified voltages at different levels using single line diagram.	[4]
Q-2 (A)	CO2_L3	Describe the opportunities and challenges related to the smart grid.	[4]
(B)	CO2_L3	Explain the concept of phasor measurement unit (PMU) and also mention its applications.	[6]

OR

(B)	CO2_L3	Enlist the different types of electric vehicles and explain the impact of PHEV on the grid.	[6]
(C)	CO2_L2	Explain the role of advanced metering infrastructure (AMI) in context to smart grid. Also discuss different components of AMI.	[6]
Q-3 (A)	CO2_L2	Enlist and Explain working of different substation equipment.	[6]
(B)	CO3_L3	Discuss the concept of substation automation.	[6]

OR

(B)	CO3_L3	Discuss the concept of home and building automation.	[6]
(C)	CO3_L3	Discuss various components of SCADA in smart Grid.	[6]

SECTION -II

Q-4 (A) CO2_L4 Discuss how voltage and frequency of the power system is maintained constant. [4]

(B) CO2_L4 Compare air insulated substation (AIS) and gas insulated substation (GIS). [6]

(C) CO3_L3 Enlist the smart grid communication technologies and also compare the wireless and wired communication technology. [6]

OR

(C) CO3_L3 Explain the role of area network in smart grid and also discuss the concept of HAN, LAN and WAN in smart grid. [6]

Q-5(A) CO4_L4 Discuss the different types of renewable energy resources and also mention the advantages and disadvantages of each renewable energy source. [6]

(B) CO4_L1 Discuss the industry and customer changing scenario with the evolution of smart grid. [6]

(C) CO4_L2 How is it possible to achieve energy efficiency in electrical systems and power system as a whole using smart grid? Do you think that such energy efficiency not achieved earlier in the absence of "smart" features of the grid? Discuss. [6]

Q-6(A) CO4_L3 With neat sketch, discuss various parts of digital relay. [6]

(B) CO4_L3 Discuss the use of Machine Learning (ML) and Artificial Intelligence (AI) in context of smart grid. [4]

(C) CO4_L3 A policy is to be designed for reducing (shaving off) the peak loads in a load curve. Suggest the changes in the policy for India to encourage peak load demand reduction. How a smart grid implementation will help in achieving it? [6]

OR

(C) CO4_L3 Discuss some of the barriers and research needs for DC power delivery systems. [6]

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