Nirma University

Institute of Technology

Semester End Examination (IR), February - 2022

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

2EEOE03 Introduction to Smart Grid

Roll / Exam No. | | Supervisor's initial with date | |

Duration: 2 hours | Max. Marks: 50

Instructions:
1. Attempt all questions.
2. Figures to right indicate full marks.
3. Draw neat sketches wherever necessary.
4. Assume suitable data, if any required and mention it clearly.
5. Notations / symbols / terms used have conventional meaning.

Q.1 (A) CO1, BL-2 Explain structure of conventional power system with different specified voltage levels using single line diagram. Also, define EHVAC systems. **[06]**

(B) CO1,2, BL-4 Compare conventional grid and smart grid. **[04]**

(C) CO4, BL-6 A power station supplies the peak load of 25MW, 20MW and 30 MW to three localities. The annual load factor is 0.6 and the diversity of the load at the station is 1.65. Calculate (a) the maximum demand on the station, (b) the installed capacity and (c) the energy supplied in a year **[05]**

Q.2 (A) CO2, BL-4 Explain the impact of integration of Plug in Hybrid Electric Vehicle (PHEV) in smart grid. Also, Discuss G2V and V2G mode of operation with suitable diagram and mathematical formulations. **[07]**

OR

CO2,BL-2 Explain the construction, working and V-I characteristics of solar cell. Also, define the maximum power point.

(B) CO2, BL-2 Discuss various type of energy storages in smart grid. **[04]**

(C) CO3, BL-2 Explain Advanced metering infrastructure with benefits and associated challenges. **[06]**

Q. 3 (A) CO3, BL-2 Discuss ICT in smart grid. Compare different type of wired and wireless communication technologies. **[06]**

(B) CO4,BL-6 A two bus system is shown in Fig.1. If a load of 125 MW is transmitted from plant 1 to the load, a loss of 15.625 MW is incurred. Determine the generation schedule and the load demand if the cost of received power is 24/MWhr. The incremental production costs of the plants are **[07]**

$$\frac{dC_1}{dP_1} = 0.25P_1 + 15$$

$$\frac{dC_2}{dP_2} = 0.20P_2 + 20$$

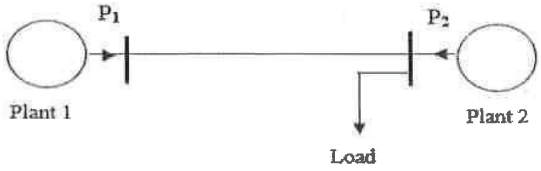

Fig. 1

OR

CO4,BL-4 Explain input-output characteristics of conventional power plant generators and discuss the following: (i) incremental fuel cost, (ii) co-ordination equation and (iii) penalty factor of the plant.

(C) CO4, BL-2 Explain the role of Big Data Anaytics with key challenges in smart grid. **[5]**

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