Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20526

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Seventh Semester

Electrical and Electronics Engineering

EE 8702 – POWER SYSTEM OPERATION AND CONTROL

(Regulations 2017)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term load curve and load forecasting in power systems.
2. List out the requirements of good power systems.
3. State the functions of primary loop LFC and secondary loop LFC.
4. Define the concept of tie-line bias control.
5. Sketch the V – I characteristics of STATCOM.
6. Mention the different types of excitation systems used in power systems.
7. What are the Constraints in Unit commitment?
8. Define Economic Dispatch Problem.
9. State the functions of SCADA.
10. State the functions of PMU in electric power grid.

PART B — (5 × 13 = 65 marks)

11. (a) A generating station has a connected load of 43MW and a maximum demand of 20MW: the units generated being 61.5 × 10^6 per annum. Calculate (i) the demand factor and (ii) load factor.

Or

(b) A diesel station supplies the following loads to various consumers: Industrial consumer = 1500kw Commercial establishment = 750kW; Domestic power = 10kW Domestic light = 450kW. If the maximum demand on the station is 2500kW and the number of kWh generated per year is 45 × 10^5, Determine (i) the diversity factor and (ii) annual load factor.

12. (a) Explain the Load Frequency Control of a Single Area System with neat block diagram.

Or

(b) Two power systems A and B are interconnected by a tie-line and have power frequency constants K_A and K_B MW/Hz, an increase in load of 500 MW on system A causes a power transfer of 300 MW from B to A. When the tie-line is open, the frequency of system A is 49 Hz and of system B is 50 Hz. Determine the values of K_A and K_B.

13. (a) Explain the principle of operation and Characteristics of STATCOM for Power System Control applications.

Or

(b) Derive the transfer function model of different excitation systems with a neat block diagram.

14. (a) Describe the Priority List method for Unit Commitment Problem.

Or

(b) Describe the Base point and Participation factor method for Economic Dispatch Problem.

15. (a) Draw the block diagram to show the hardware configuration of a SCADA for a power system operation and explain the application of SCADA for power system monitoring and control.

Or

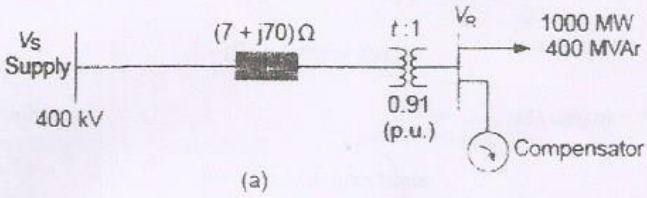
(b) Explain the various operating states of power system. Also discuss the state transitions and control strategies using state transition diagram.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the role of energy control centre in the modern power systems with a neat block diagram.

Or

(b) A transmission link (Figure 16 (b) (i) connects an infinite busbar supply of 400 kV to a load busbar supplying 1000 MW, 400 MVAr. The link consists of lines of effective impedance (7+j70) Ω feeding the load busbar via a transformer with a maximum tap ratio of 0.9:1. Connected to the load busbar is a compensator. If the maximum overall voltage drop is to be 10% with the transformer taps fully utilized. Calculate the reactive power requirement from the compensator, (Note: Refer voltage and line Z to load side of transformer in Figure 16 (b) (ii).



(a)

Figure 16 (b) (i)

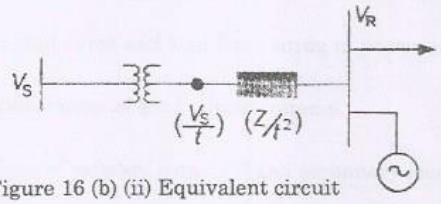


Figure 16 (b) (ii) Equivalent circuit