Reg. No.													

Question Paper Code	11476

17 DEC 2022

B.E./B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Seventh Semester

Electrical and Electronics Engineering

EE8702 - POWER SYSTEM OPERATION AND CONTROL

(Regulations 2017)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Show the speed – load characteristics.	2,K2, CO1
2.	Name two major parts of the frequency control loop.	2,K2, CO1
3.	Define control area.	2,K2, CO2
4.	Quote about AFRC.	2,K2, CO2
5.	Compare shunt and series capacitors.	2,K2, CO3
6.	Summarize the common advantages of STATCOM.	2,K2, CO3
7.	Show the input - output characteristics of thermal power stations.	2,K2, CO4
8.	Define incremental transmission loss.	2,K2, CO4
9.	Distinguish between reliability and security of power system.	2,K2, CO5
10.	List the three major functions of power system security.	2,K2, CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Two synchronous generators are operating in parallel. Their capacities are 400 MW and 700 MW. The droop characteristics of their governor are 3% and 4% from no load to full load. Assuming that the generators are operating at 50 Hz at no load, infer how would be a load of 1000 MW will be shared between them. What will be the system frequency at this load? Assume free governor action.	13, K2,CO1
		OR	
	b)	(i) Explain the need for voltage and frequency regulation in a power system.	4, K2,CO1
		(ii) With a neat sketch explain P-F and Q-V control system for the smooth operation of the power system.	9, K2,CO1
12.	a)	Draw the block diagram of uncontrolled two area load frequency control system and describe the salient features under static condition.	13, K2,CO2
		OR	

b) Develop the state variable model of a two-area system and state the advantages of the model. 13, K2,CO2

13. a) Draw the block diagram for a typical excitation system and develop the transfer function model. 13, K2,CO3

OR

b) Explain with neat diagram and V-I characteristics, the basic operating of TCR and TSC. 13, K2,CO3

14. a) Build the Flow chart and explain Economic dispatch by λ Iteration method without loss. 13, K2,CO4

OR

b) The fuel cost functions for three thermal plants in $/h are given by
$F1=0.0045P_{g1}^2+5.2P_{g1}+580$, $F2=0.0056P_{g2}^2+4.5P_{g2}+640$
$F3=0.0079P_{g3}^2+5.8P_{g3}+820$
where P_{g1},P_{g2},P_{g3} are in MW. Estimate the optimal dispatch and the total cost when the total load is 925 MW with the following generator limits. 13, K2,CO4
$250MW \leq Pg1 \leq 450MW$, $200MW \leq Pg2 \leq 350MW$, $125MW \leq Pg3 \leq 250MW$

15. a) Describe SCADA system for power system, its hardware components and applications. 13, K2,CO5

OR

b) Explain various state transitions and control strategies using state transition diagram. 13, K2,CO5

PART C (1 × 15 = 15 Marks)

16. a) (i) Construct the priority list for the units given below. 8,K2,CO4
$H1=510+7.20P_1+0.00142P_1^2$,
$P_{min}=150MW$.$P_{max}=600MW$, Fuel cost=1.1Rs/MBtu.
$H2=310+7.85P_2+0.00194P_2^2$,
$P_{min}=100MW$.$P_{max}=400MW$, Fuel cost=1.0Rs/MBtu.
$H3=78+7.97P_3+0.00482P_3^2$,
$P_{min}=50MW$.$P_{max}=200MW$, Fuel cost=1.2Rs/MBtu.
For the demand of 550MW.

(ii) Write short notes on state estimation? Explain the help of flow chart the weighted least square estimation. 7,K2,CO5

OR

b) (i) Explain briefly the constraints on unit commitment problem. 7,K2,CO4
(ii) Discuss briefly how the system states are continuously monitored and controlled. 8,K2,CO5