Code No: **RT41023**



Set No. 1

IV B. Tech I Semester Supplementary Examinations, November - 2022 POWER SYSTEM OPERATION AND CONTROL

Time: 3 hours

(Electrical and Electronics Engineering)

Max. Marks: 70

[8]

Question paper consists of Part-A and Part-B Answer ALL sub questions from Part-A Answer any THREE questions from Part-B *****

PART-A (22 Marks)

1.	a)	Define the terms the production costs, total efficiency and incremental rates	
		with respect to thermal power plant.	[3]
	b)	What is the need of hydrothermal scheduling?	[3]
	c)	What are the advantages of using dynamic programming method for unit	
		Commitment?	[4]
	d)	Obtain the modeling of hydro turbine.	[4]
	e)	What is the need of PI control of single area power system?	[4]
	f)	What is the need for FACTS in power system?	[4]

<u>**PART-B**</u> (3x16 = 48 Marks)

2. a) The incremental costs in Rs/MWH for two units in a plant are given by,

$$\frac{dF_1}{dP_1} = 1.0P_1 + 200; \quad \frac{dF_2}{dP_2} = 1.2P_2 + 160$$

The minimum and maximum generation on each unit are to be 20 MW and 125 MW respectively. Determine the economic allocation between the units for a total load of 150 MW. [8]

- b) Derive transmission loss formula in terms of B- coefficients. [8]
- 3. a) Explain about hydro thermal co-ordination with necessary equations. [8]
 - b) In a two plant operation system, the hydro plant is operation for 10 hrs, during each day and the steam plant is to operate all over the day. The characteristics of the steam and hydro plants are

 $C_T = 0.04 P_{GT}^2 + 30 P_{GT} + 10 Rs/hr$ WH =0.12 $P_{GH}^2 + 30 P_{GH} m^3/sec$

When both plants are running, the power flow from steam plant to load is 150 MW and the total quantity of water is used for the hydro plant operation during 10 hrs is 150×10^6 m³. Determine the generation of hydro plant and cost of water used. Neglect the transmission losses.

- 4. a) Describe the various constraints related to Unit Commitment Problem. [8]
 - b) Discuss the Dynamic programming method to solve Unit commitment problem in power systems. [8]

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[8]

- 5. a) Derive the model of speed governing system and represent it by a block diagram. [8]
 - b) Obtain the dynamic response of change in frequency of isolated power system with block diagram. [8]
- 6. a) Explain the proportional plus integral control for load frequency control of single area system. [8]
 - b) Describe the combined load frequency control and economic dispatch control with neat block diagram.
 [8]
- 7. a) Write advantages and disadvantages of different types of compensating equipment for transmission systems and explain load compensation.
 - b) A 3 phase over head line has resistance and inductive reactance per phase of 25 ohm and 90 ohm respectively. With no load at the receiving end a synchronous compensator there takes a current lagging by 90⁰, The supply voltage is 145 KV while the load end voltage is maintained at 132KV. Calculate the value of current taken by the compensator. When the load at the receiving end is 50MW, it is found that the line can operate with unchanged voltages at sending end and receiving end. Provided that the compensator takes the same current as before but now leading by 90⁰. Calculate the reactive power of the load.

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