



**B.Tech VII Semester Regular/Supplementary Examinations, November 2022**

**POWER SYSTEM OPERATION AND CONTROL**  
(Electrical and Electronics Engineering)

**Maximum Marks: 70**

Date: 01.12.2022 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

**Part-A**

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Define production cost?
- 2 Draw the input-output characteristics of a Thermal plant.
- 3 What is hydrothermal scheduling?
- 4 Draw the hydroelectric power plant model?
- 5 What are the assumptions made in dynamic response of uncontrolled case in single area load frequency control?
- 6 Why Proportional plus Integral control of single area is required?
- 7 List out the specifications of load compensator?
- 8 What is the need of reactive power control in a power system?
- 9 Define state estimation?
- 10 What do you understand by network topology?

**Part-B**

Answer All the following questions.

(5X10M=50Marks)

- 11 A. Derive an expression for economic distribution of load between generating units including the effect of transmission losses. [5+5]  
B. Consider the following incremental costs curves in Rs/MWh for a plant having 2 units.

$$\frac{dC_1}{dP_{G1}} = 0.20P_{G1} + 40$$

$$\frac{dC_2}{dP_{G2}} = 0.25P_{G2} + 30$$

Calculate the extra cost incurred in Rs/h, if a load of 220MW is scheduled as  $P_{G1} = P_{G2} = 11MW$

OR

- 12 A. Give various advantages of general loss formula and state the assumptions made for calculating  $B_{mn}$  coefficients. [5+5]  
 B. A constant load of 300MW is supplied by two 200MW generators, 1 and 2 for which the respective incremental fuel costs are
- $$\frac{dC_1}{dP_{G1}} = 0.1P_{G1} + 20$$
- $$\frac{dC_2}{dP_{G2}} = 0.12P_{G2} + 15$$
- With powers " $P_G$ " in MW and costs " $C$ " in Rs/h. Determine (i) The most economical division of load between the generators, (ii) The saving in Rs/day thereby obtained Compared to equal load sharing between machines.
- 13 A. Explain in detail about the hydro thermal economic scheduling problem?  
 B. Explain in detail about the functioning of speed governing system and obtain its necessary mathematical modeling with neat diagram. [4+6]
- OR
- 14 A. Explain in detail about the fundamental characteristics of an excitation system.  
 B. Explain in detail about the block diagram representation of IEEE Type-1 model with neat sketch. [5+5]
- 15 A. Explain in detail about the load frequency control for a single area system with a neat block diagram?  
 B. Derive the expression for analysis of integral control for steady state response? [5+5]
- OR
- 16 A. Distinguish between load frequency control and economic dispatch control?  
 B. Obtain the mathematical modeling of tie line power in an inter connected system and its block diagram? [5+5]
- 17 A. Compare the different types of compensating equipment for transmission system?  
 B. Write a short note on compensated and uncompensated transmission lines. [5+5]
- OR
- 18 A. List out the merits and demerits of shunt and series compensation of transmission systems?  
 B. Explain in detail about the reactive power compensation in transmission systems? [5+5]
- 19 A. Explain in detail about the various functions of energy control Centre?  
 B. Explain in detail about the Contingency analysis of power system? [5+5]
- OR
- 20 A. What is EMS? What are its major functions in power system operation and control?  
 B. Explain in detail about the different operating states of power system with state transition diagram [5+5]