

**IV B.Tech I Semester Supplementary Examinations, February- 2019**  
**POWER SYSTEM OPERATION AND CONTROL**  
**(Electrical and Electronics Engineering)**

Time: 3 hours

Max. Marks: 70

*Question paper consists of Part-A and Part-B*  
*Answer ALL sub questions from Part-A*  
*Answer any THREE questions from Part-B*  
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**PART-A** (22 Marks)

1. a) Draw the incremental cost curve of thermal unit. [3]
- b) Why hydro and thermal systems must be coordinated? [4]
- c) Name some thermal constraints in unit commitment problem. [3]
- d) Explain the advantages of tie line bias control. [4]
- e) What is the necessity of maintaining frequency of the system constant? [4]
- f) Show that the shunt compensation improves the critical voltage as well as power factor. [4]

**PART-B** (3x16 = 48 Marks)

2. a) Derive necessary condition for economic operation of N-plant system considering transmission losses. [8]
- b) A power system consists of two 200MW units whose input cost data are represented by the equations:  $C_1 = 0.03P_1^2 + 21P_1 + 750$  Rs/hour,  $C_2 = 0.5P_2^2 + 18P_2 + 980$  Rs/hour. If the total received power  $P_R = 350$  MW, determine the load division between the units for the most economic operation. [8]
3. a) Explain the problem of scheduling hydrothermal power plants. Explain the constraints in the problem. [8]
- b) Derive mathematical formulation for short term hydro thermal scheduling. [8]
4. a) What is meant by unit commitment problem? Explain the need for unit commitment problem in operation of power system. [8]
- b) With the help of flow chart, explain the solution of unit commitment problem using dynamic programming. [8]
5. a) Draw the block diagram of hydro turbine and obtain its modelling. [8]
- b) Explain the dynamic response of an isolated area for load frequency control with first order approximation. [8]
6. For a single area system, show that the static error in frequency can be reduced to zero using frequency control and comment on dynamic response of controlled system with necessary equation. [16]
7. a) Compare series, shunt compensations with their advantages and disadvantages. [8]
- b) What is the importance of load compensation? What are the specifications of load compensation equipment? [8]