

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 2729**

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**B.Tech.**

(SEM. VII) THEORY EXAMINATION 2011-12

**POWER SYSTEM OPERATION AND CONTROL**

Time : 3 Hours

Total Marks : 100

**Note** :—Attempt **all** the questions.

1. Attempt any **four** parts of the following : (5×4=20)
  - (a) Discuss the merits of interconnected power system on the basis of following factors : (i) Reduced overall installed capacity (ii) Better Utilization of Hydro Power (iii) Improved Quality of voltage and frequency (iv) High System Security.
  - (b) With the help of block diagram discuss the SCADA system.
  - (c) Describe in detail various system operating stages.
  - (d) Discuss the following (i) System monitoring (ii) Corrective action analysis.
  - (e) Discuss the role of national load dispatch centre. Draw the block diagram of various level in power system.
  
2. Attempt any **two** parts of the following : (10×2=20)
  - (a) What is the objective in economic scheduling ? Also derive the condition for optimal allocation of total load among units in a thermal station when losses are not neglected.

- (b) The incremental fuel costs for two plants are given by :

$$\frac{dC_1}{dP_1} = 0.10P_1 + 20, \text{ Rs/MWhr}$$

$$\frac{dC_2}{dP_2} = 0.15P_2 + 22.5 \text{ Rs/MWhr}$$

The system is operating at the optimum condition with

$$P_1 = P_2 = 100 \text{ MW and } \frac{\partial P_1}{\partial P_2} = 0.2. \text{ Find the penalty factor}$$

of plant 1 and the incremental cost of received power.

- (c) Discuss in length the equality constraints and Inequality constraints for power system.

3. Attempt any **two** parts of the following : (10×2=20)

- (a) Two generators rated 300 MW and 600 MW are operating in parallel. Their governors have a droop characteristics of 4% and 5% respectively from no load to full load. Assuming that the generators are operating at 50 Hz at no load, determine how would a load of 750 MW be shared between them. What will be the system frequency at this load ? Assume free governor action.
- (b) With the help of Block diagram explain the load frequency control of two area system.
- (c) Discuss the following : (i) Economic dispatch control (ii) Area control error (iii) Parallel frequency control.

4. Attempt any **two** parts of the following : (10×2=20)

- (a) With the help of block diagram discuss two types of Excitation System.
- (b) Explain how transformers are used to control the flow of real and reactive power in power system network. Also discuss advantages and disadvantages of series compensation.
- (c) Write the parameters and factors for specifying a load compensator.

5. Attempt any **two** parts of the following : (10×2=20)

- (a) What is state estimation ? How it helps the power system engineer for control and operation ?
- (b) Discuss the concept and objectives of FACTS.
- (c) Draw the characteristic curves for the following :
- (i) STATCOM
  - (ii) TCSC
  - (iii) SSSC