EEE031

(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 $P_1 = P_2 = 100$ MW and $\frac{\partial P_1}{\partial P_2} = 0.2$. 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