Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE) (2011 Onwards E-II)

B.Tech.(Electrical & Electronics) (2011 & 2012 Batch E-II)

(Sem.–7,8)

POWER SYSTEM OPERATION AND CONTROL

Subject Code : BTEE-804A

Paper ID : [A3035]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Answer briefly :

   a. What is the incremental fuel rate for thermal and hydro unit? Draw the appropriate characteristics.

   b. Make a distinction between economic load dispatch and unit commitment.

   c. What is penalty factor? To which generator it imposes a penalty?

   d. Summarize the well formulated economic load dispatch problem when losses are neglected.

   e. Are AVR and ALFC control loops truly non-interacting? Justify your answer.

   f. What is the open loop gain of an AVR loop if the static frequency error is 3%?

   g. Exciter control is used to regulate the voltage level. Does exciter supplies reactive VARs?

   h. Why it is absolutely advantages to transmit power at EHVAC / HVDC level?

   i. What is value area control error (ACE) in the tie-line bias control?

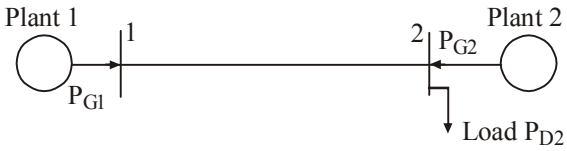
   j. Explain why DC power flow method is used during the contingency analysis of AC system

SECTION-B

2. Two synchronous generators operating in parallel supply a total load of 200 MW. The ratings of the machines 1 and 2 are 100 MW and 200 MW. Machines 1 and 2 have governor droop characteristic of 4% and 3% respectively, from no load to full load. Assume that at full load, machines run at rated speed and the system frequency is 50 Hz. Calculate the load taken by each machine and the operating frequency.

3. For the two bus system shown below, if 125 MW is transmitted from plant 1 to the load, a transmission loss of 10 MW is incurred. Find the required generation for each plant and the power received by the load when system λ is Rs 25/MWh. The incremental fuel costs of the plants are as -

$dC_1/dP_{g1} = 0.02P_{g1} + 16.0$ Rs/MWh ; $dC_2/dP_{g2} = 0.04P_{g2} + 20.0$ Rs/MWh



4. Draw the schematic of turbine governing system and explain the operation under (i) change in speed changer setting (ii) change in frequency.

5. The typical AVR system with unity feedback has open loop transfer function.

$G(s) = K/((1+sT_A)(1+sT_E)(1+sT_{d0}))$.

a. Obtain the relation between static error and open loop gain.

b. Effect of gain K on stability.

6. Develop the mathematical model of DC link.

SECTION-C

7. Develop the mathematical model of tie-line. For two area system, obtain the static frequency error and tie line power interchange for step change in load demands.

8. Explain :

a. The dynamic programming method for unit commitment.

b. Fixed and variable head hydro plant.

9. Explain the generator and line outage sensitivity factors for contingency analysis and the method to correct generation dispatch using them.