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10EE82

Eighth Semester B.E. Degree Examination, June/July 2018
Power System Operation and Control

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain the role of Automatic Generation Control (AGC) in a power system. **(04 Marks)**

b. Explain the operation of Isolated power system without AGC or Central computers. **(08 Marks)**

c. Explain the parallel operation of two units of different capacity and regulation characteristics. **(08 Marks)**

2 a. Two areas A and D are interconnected with system frequency 50Hz, generating capacity of A is 36,000 MW with regulating characteristics of 1.5% per 0.1Hz and B has generating capacity of 4000 MW with regulating characteristics of 1% per 0.1Hz. For a + 400 MW disturbance (load increase) is occurring in area D. Determine **(08 Marks)**

i) Change in frequency and steady state frequency after the disturbance.

ii) Tie line power and each area's share for disturbance.

iii) Change in frequency and actual steady state frequency after the disturbance, if area D is not interconnected.

iv) Repeat (a) , (b) and (c) for -400MW disturbance (load decrease) occurring in area D.

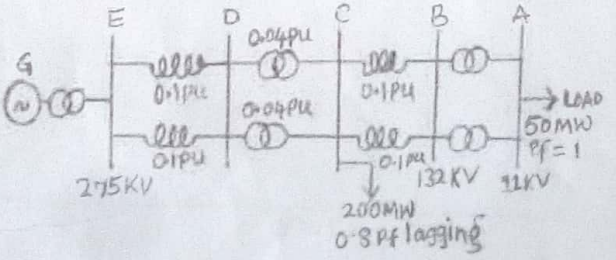
b. Obtain the open loop model of an automatic load frequency control of single area isolated power system. **(12 Marks)**

3 a. Draw the model for two area system interconnected through weak tie line and obtain the equation for static frequency drop the tie line power by applying static frequency response. **(10 Marks)**

b. A two area system has following data
Area A, Rated capacity = 500 MW , Speed regulation = 2.5Hz/Pu MW ;
Area B, Rated capacity = 2000MW ; Speed regulation = 2Hz/Pu MW.
In each area 1% change in load occurs for 1% change in frequency. Find the steady state change in frequency and change in tie line power if 20MW of load changes in
i) Area A and ii) Area B. **(10 Marks)**

4 a. Show that real power flow between two nodes is determined by the transmission angle 'δ' and the reactive power flow is determined by the scalar voltage difference between the nodes. **(10 Marks)**

b. In the radial transmission system shown figure Q.4(b) below, all p.u values are referred to the voltage bases shown and 100 MVA. Determine the power factor at which the generator must operate. Neglect I^2X losses in generator transformer. **(10 Marks)**



PART – B

5 a. Obtain the coordination equation for optimum loading of thermal power plants neglecting generation limits and losses. (07 Marks)

b. Explain the thermal constraints and must run constraints in unit commitment. (06 Marks)

c. Explain Spinning reserve and its allocation criteria. (07 Marks)

6 a. What do you understand by "Secured power system" and "Power system black out"? (04 Marks)

b. Explain about three basic ways to obtain quicker power system security analysis study. (06 Marks)

c. Explain the DC load flow method for contingency analysis using linear sensitivity factors with relevant flow charts. (10 Marks)

7 a. Explain the hierarchy control of a power system with Energy Management System. (07 Marks)

b. Explain errors and detection in Power System State Estimation (PSSE). (06 Marks)

c. Explain about different operating states of a power system. (07 Marks)

8 a. Define Reliability of a system. (02 Marks)

b. Explain three modes of failure of a system. (08 Marks)

c. Obtain the expression for steady state reliability and General reliability function. (10 Marks)

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