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10EE82

Eighth Semester B.E. Degree Examination, June/July 2016
Power System Operation and Control

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain different operating states of a power system with the help of a block diagram. **(08 Marks)**

b. Derive expression for frequency deviation Δf and tie line power flow ΔT_L in a two area inter connected power system. **(08 Marks)**

c. What is an ECC? Mention its functions. **(04 Marks)**

2 a. With relevant characteristics, explain parallel operation of two generators with different capacity and regulation. **(07 Marks)**

b. Draw the schematic of load frequency control and excitation voltage regulators of a generator and explain. **(07 Marks)**

c. A synchronous generator rated 100MVA operates on full load at unity power factor with frequency 50Hz. The load is suddenly reduced to 50MV. Due to time lag in governor system, the steam valve begins to close after 0.4 seconds. Determine the change in frequency that occurs in this time. Take H = 5kW-sec/KVA of generator capacity. **(06 Marks)**

3 a. Explain with block diagram, the modeling of
i) Speed governing system ii) Turbine iii) Generator and load. **(10 Marks)**

b. With a block diagram representation, explain tie-line bias control of a two area load frequency control. **(10 Marks)**

4 a. List the components that absorb and generate reactive power in an electric system. **(06 Marks)**

b. Fig. Q4(b) shows one line diagram of a power system with three supply points A, B and C connected to a common busbar M. If at a particular system load, the line voltage of M falls below its nominal value by 5kV, Calculate the magnitude of the reactive volt-ampere injection required at M to re-establish the original value. The pu values are expressed on a 500MVA base. **(08 Marks)**

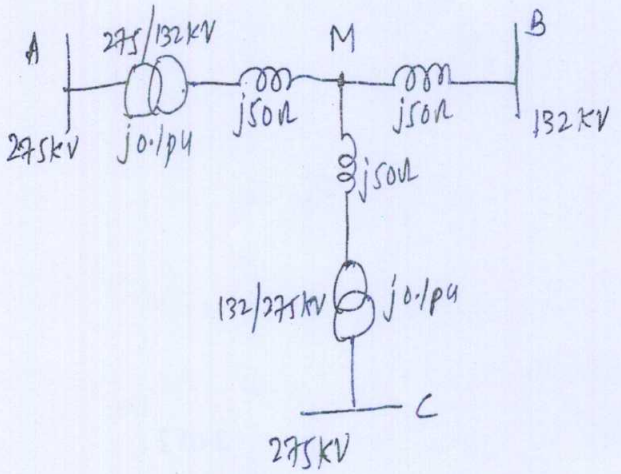

Fig. Q4(b)

c. Define:
   i) Voltage stability
   ii) Voltage collapse and
   iii) Sub synchronous resonance. **(06 Marks)**

PART – B

5 a. Obtain the exact coordination equations for optimum loading of thermal power plants considering transmission losses. **(06 Marks)**

b. With the help of a flow chart, explain the dynamic programming method in unit commitment solution. **(10 Marks)**

c. Explain priority – list method for unit commitment problem with an example. **(04 Marks)**

6 a. Explain the factors affecting power system security. **(06 Marks)**

b. Explain, with an example, the security constrained optimal power flow (SCOPF). **(06 Marks)**

c. Explain contingency analysis, using a flow chart. **(08 Marks)**

7 a. What is energy management system? **(04 Marks)**

b. Explain the weighted least squares estimation (WLSE) method of power system state estimation. **(10 Marks)**

c. Explain :
   i) Difference between load flow problem and state estimation problem
   ii) Suppression of bad data in state estimation problem. **(06 Marks)**

8 a. With a graph, explain the following :
   i) Early failure
   ii) Wear out failure and
   iii) Chance failure. **(08 Marks)**

b. A system has three generating units, each of 50MV capacity. The forced outage rate (FOR) of each unit is 0.03. Find the total number of states and their probability of occurrence. **(08 Marks)**

c. Write the possible states of a two unit system in a table form. **(04 Marks)**

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