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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; May/June - 2018

Power System Operation and control

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Derive an expression for tie-line power flow and frequency deviation for a two area power system. 10

b. Explain Area Control Error (ACE). 5

c. Two synchronous generators are initially supplying a common load 1 p.u frequency (60 Hz). The rating of unit 1 is 337 MW and has 0.03 p.u droop built into its governor. Unit 2 is rated at 420 MW and has 0.05 p.u droop. Find each units share of a 0.10 p.u increase in the load demand. Also find new line frequency. 5

2 a. Explain parallel operation of generators with necessary derivations. 10

b. With a neat block diagram, explain digital computer configuration for power system control. 10

UNIT - II

3 a. Explain ALFC of a two area system. Also explain its dynamic response. 10

b. Consider two 50 Hz interconnected systems, the connected load is 15000 MW in area 1 and 30000 MW in area 2.The generations are 14000 MW and 31000 MW respectively. D = 1.0 and R = 5% for both areas. Determine the steady state frequency for a loss of 1000 MW in area 1 with and without supplementary control. 10

4 a. Explain the concepts of control area and obtain transfer function model of ALFC of a single area. 10

b. A two area load frequency control has the following specifications : 10

	Rated capacity in MW	Regulation in %	Load in MW
Area 1:	100	4	60
Area 2:	30	3	10

For a change in load of 10 MW in Area 2, find the power transmitted in the line and operating frequency.

UNIT - III

5 a. Show that the reactive power is largely dependent on changes in voltage and real power is largely dependent on changes in transmission angle. 10

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b. In the radial transmission system shown base in Fig. 5(b), find the power factor at which the generator must operate. Assume 100 MVA base and all valves shown on figure are referred to voltage bases. 10

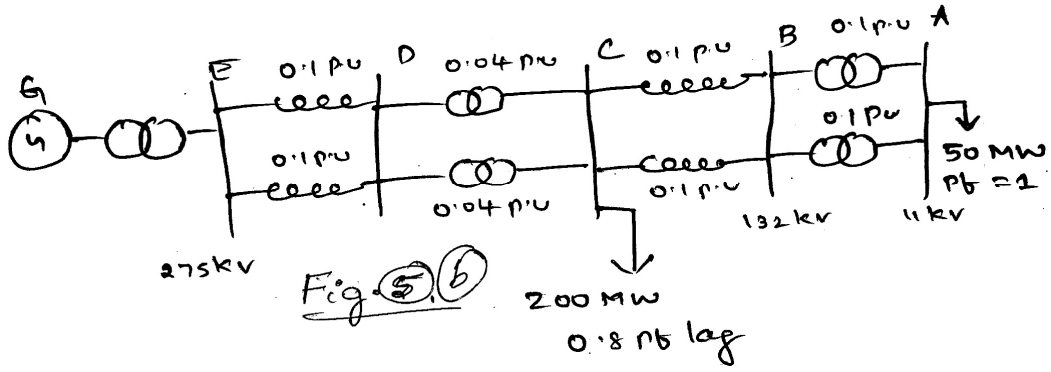

Fig. 5(b)

6 a. Obtain relationship between voltage, power and reactive power at a node and across a transmission line. 10

b. Discuss briefly on voltage control using :

i) Reactive power injection 10

ii) Tap changing transformer

UNIT - IV

7 a. Explain unit commitment and constraints involved in unit commitment. 10

b. Explain the priority list method of solving unit commitment problem with an example. 10

8 a. Construct a priority list for three units whose data are given below :

Unit	Full load Average Production cost Rs/MWH	P_G^{min} MW	P_G^{max} MW
1	1000	150	500
2	850	100	500
3	1040	125	200

5

b. Explain spinning reserve with an example. 5

c. Explain difference between economic dispatch and unit commitment. 5

d. List the parameters to be considered while solving unit commitment problem. Also list out the assumptions made while solving the unit commitment problem. 5

UNIT - V

9 a. Explain the power system security functions with an example. 10

b. Explain contingency analysis with a flow chart. 10

10 a. Explain contingency analysis using sensitivity factors with a flow chart. 10

b. Explain any one method of contingency selection procedure with a flow chart. 10

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