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Question Paper Code : X 67589

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Seventh Semester
Electrical and Electronics Engineering
EE 1401 – POWER SYSTEM OPERATION AND CONTROL
(Regulations 2008)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is meant by transfer of power between active sources ?
2. What are the composite regulating characteristics of power systems ?
3. List out various needs for frequency regulation in power system.
4. What is "AGC" ?
5. State the various types of excitation systems.
6. What is the role of exciter in voltage control ?
7. Define "Load duration curve".
8. What is unit commitment problem ?
9. Briefly explain the various components of SCADA.
10. What are the advantages of dynamic programming method ?

PART – B **(5×16=80 Marks)**

11. a) i) Explain the structure of modern power system in detail. **(10)**

ii) Discuss the generator response to a load change in power system operation. **(6)**

(OR)

b) Two generators rated 400 MW and 700 MW are operating in parallel. The droop characteristics of their governors are 3% and 4% respectively from no-load to full-load. Assuming that the governors are operating at 50 Hz at no load, how would a load of 1000 MW be shared between them ? What will be the system frequency at this load ? Determine the full load speed for each machine. **(16)**

12. a) i) A single area consists of two generating units rated at 400 and 800 MVA with speed regulation of 4% and 5% on their respective ratings. The units are operating in parallel sharing 700 MW. Unit – 1 supplies 200 MW and Unit – 2 supplies 500 MW at 1.0 per unit, 50 Hz frequency. The load is increased by 130 MW. **(10)**

1) Assuming there is no frequency dependent load i.e. D = 0, find the steady state frequency deviation and the new generation on each unit.

2) The load varies 0.8% for every 1% change in frequency i.e. D = 0.8. Find the steady state frequency deviation and the new generation on each unit.

ii) Write a detailed technical note on the performance of AGC under normal and abnormal conditions. **(6)**

(OR)

b) i) A 50 Hz generator of reactance 0.8 pu is connected to an infinite bus through a line of 0.4 pu reactance. E = 1.05 pu, V = 1.0 pu. The inertia constant is 4 MJ/MVA. The generator is loaded to 70% of the maximum power limit. Determine the frequency of natural oscillations. Derive the expressions used. **(10)**

ii) Explain in brief about the importance of frequency control. **(6)**

13. a) i) Develop a typical excitation arrangement to control the voltage of an alternator and explain. **(9)**

ii) Briefly explain the role of tap changing transformer in voltage control. **(7)**

(OR)

b) What is static VAR compensator ? Where it is used ? Explain its operation and state the merits of static VAR compensator over other methods of voltage control. **(16)**

14. a) Define Unit commitment problem. What are its constraints ? Explain its solution by dynamic programming. **(16)**

(OR)

b) i) Describe the solution of coordination equations by Lambda – iteration method. **(8)**

ii) Define base point and participation factors. Explain them. **(8)**

15. a) Discuss the various operating states and the control strategies of a power system. **(16)**

(OR)

b) What is SCADA ? Discuss it in detail. **(16)**

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