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Question Paper Code : 60515

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016

Seventh Semester

Electrical and Electronics Engineering

EE 2401/10133 EE 701/EE 71 – POWER SYSTEM OPERATION AND CONTROL

(Regulations 2008/2010)

(Common to PTEE 2401/10133 EE 701 – Power System Operation and Control for B.E. (Part-Time) Fifth Semester– Electrical and Electronics Engineering – Regulations 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the significance of load forecasting?

2. What is demand factor?

3. Find the open loop gain of an Automatic voltage regulator loop if the static error does not exceed 2%.

4. Brief the application of secondary ALFC loop in power system networks.

5. What are the various functions of excitation system?

6. What are the advantages and disadvantages of synchronous compensators?

7. What is incremental cost criterion?

8. Name some thermal constrains in unit commitment problem.

9. What is meant by state estimation?

10. What are the functions of SCADA?

PART B — (5 × 16 = 80 marks)

11. (a) Explain with help of block diagram the role of computers and implementation in power system control. (16)

Or

(b) A generating station has the following daily loads. (16)

Time (Hours) :	0–6	6–10	10-12	12–16	16-20	20-24
Load (MW) :	20	25	30	25	35	20

Sketch the load curve, load duration curve and determine

(i) Maximum demand

(ii) Units generated per day

(iii) Average load

(iv) Load factor

12. (a) With the block diagram of speed governing system, explain the Automatic Load Frequency Control. Also derive necessary equations.

Or

(b) A sub-grid has total rated capacity 2500 MW, It encounters a load increase of 50 MW if the normal operating load is 1000 MW, Assume inertia constant (H) to be 5 sec and regulation of the generators in the system as 2 Hz/p,u MW, Find (i) ALFC loop parameters (ii) Static frequency drop, (iii) Transient response of the ALFC loop. Assume load frequency dependency to be linear.

13. (a) (i) Discuss the relation between voltage and reactive power at a node. (9)

(ii) Explain briefly the reactive power requirement for control of voltage in long radial lines. (7)

Or

(b) Explain the methods of voltage control in a transmission system.

(i) By transformer tap setting. (8)

(ii) By Booster transformer. (8)

14. (a) State the unit commitment problem. With the help a flow chart, explain forward dynamic programming solution method of unit commitment problem. (16)

Or

(b) The fuel inputs per hour of plants 1 and 2 are given as

$F_1 = 0.2P_1^2 + 40P_1 + 120$ Rs/hr

$F_2 = 0.25P_2^2 + 30P_2 + 150$ Rs/hr

Determine the economic operating schedule and the corresponding cost of generation. The maximum and minimum loading on each unit is 100 MW and 25MW. Assume the transmission losses are ignored and the total demand is 180 MW. Also determine the saving obtained if the load is equally shared by both the units. (16)

15. (a) (i) What is EMS? What are its major functions in power system operation and Control? (6)

(ii) Explain the major functions of system security control. (10)

Or

(b) Draw the state transition diagram of a power system. Explain the state transition that may occur due to system disturbance and also different control actions that can be taken to improve the security level of the system. (16)
