Reg. No. :

Question Paper Code : 86597

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

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 "Complex Power"?

2.   How does the load response to frequency deviation?

3.   How is the real power in a power system be controlled?

4.   What is meant by control area?

5.   Compare and contrast an-load and off-load tap changing.

6.   Mention the applications of booster transformer.

7.   Define load factor.

8.   Write the coordination equation without loss and with loss.

9.   Define "Stability of a power system".

10. What is the need of restructuring of power systems?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss the classification of loads and elaborate their characteristics.
                                                                              (8)

         (ii) Write a detailed technical note on the operating problems in power
               systems.   (8)

                                        Or

(b) (i) Derive the model of speed governing system. Also explain the various components of it in detail. (8)

(ii) Illustrate with a neat schematic diagram, the structure of modern power system. (8)

12. (a) Develop the transfer function block diagram of a LFC for single area power system. 'Also, explain the dynamic response analysis of the same. (16)

Or

(b) Briefly explain die, static and dynamic response analysis of two area power system. (16)

13. (a) (i) What is the role of exciters in voltage control? Explain. (8)

(ii) Define voltage regulation. Derive the relation between voltage regulation and reactive power. (8)

Or

(b) (i) What are the different methods of voltage control? Explain them. (8)

(ii) Describe briefly about FACTS Controllers and applications. (8)

14. (a) The fuel cost in $/hr of three thermal plants of a power system are (16)

$C_1 = 200 + 7.0\ P_1 + 0.008\ P_1^2$ $/hr

$C_2 = 180 + 6.3\ P_2 + 0.009\ P_1^2$ $/hr

$C_3 = 140 + 6.8\ P_3 + 0.007\ P_3^2$ $/hr

Where P_1, P_2 and P_3 are in MW. Plant outputs are subject to the following limits.

10 MW $\leq$ 85 Mw

10 MW $\leq$ 80 Mw

10 MW $\leq$ 70 Mw

Assume the real power loss given by

$P_L = 0.0218\ P^2 + 0.0228\ P_2^2 + 0.0179\ P_3^2.$

Or

(b) (i)   What are the various factors to be considered for an unit commitment problem?   (6)

     (ii) Define the following terms

           (1) Minimum up time

           (2) Minimum down time

           (3) Crew constraints

           (4) Hot reserve

           (5) Cold reserve.   (10)

15. (a)   Explain various operating states and control strategies of Power system.

                                                                            (16)

                               Or

     (b) (i)   What is meant by "Restructuring" of power system?   (4)

          (ii) Enumerate the difference between restructured and regulated power system.   (4)

          (iii) Explain the need of Computer Control of power system.   (8)

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