B.E. Seventh Semester (Elect Engg (E & P), Ele and Electro, Ele & Power, Ele. Energy)) (CGS)

10458 / 10572 / 10515 : Power System Operation and Control

7 EE 02 / 7 EP 02 / 7 EL 02

P. Pages : 2 | **AU - 2904**

Time : Three Hours | Max. Marks : 80

* 0 2 5 3 *

Notes : 1. Answer **three** question from Section A and **three** question from Section B.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answer necessary with the help of neat sketches.
5. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) Define following terms related to economic operation of power system. **8**

1) Unit commitment problem 2) Input-output characteristics
3) Load scheduling problem 4) Heat rate characteristics

b) The fuel cost of two units are given by – **7**

$$C_1 = C_1(PG_1) = 1.0 + 25\ PG_1 + 0.2PG_1^2 \text{ Rs./ hr.}$$

$$C_2 = C_2(PG_2) = 1.5 + 35\ PG_2 + 0.2PG_2^2 \text{ Rs./ hr.}$$

If the total demand on the generators is 200MW, find the economic load scheduling of the two units

OR

2. a) Explain the various factors to be considered in allocating generation to different power stations for optimum operation. **7**

b) Derive the expression for transmission loss in terms of loss coefficients for the system having two generators supplying 'n' number of loads. State the assumptions made. **8**

3. Derive the expression for exact coordination equation using Lagaranges Multiplier method. Hence derive the expression for penalty factor. Explain the significance of penalty factor. **13**

OR

4. a) Explain the need of an optimal Unit Commitment (UC) problem **4**

b) Explain the functions of automatic load dispatch. **4**

c) Determine the incremental cost of received power and the penalty factor the plant shown in fig. 4.1 if the incremental cost of production is **5**

$$\frac{dC_1}{dP_{G_1}} = 0.1P_{G_1} + 3.0 \text{ Rs / MWh}$$

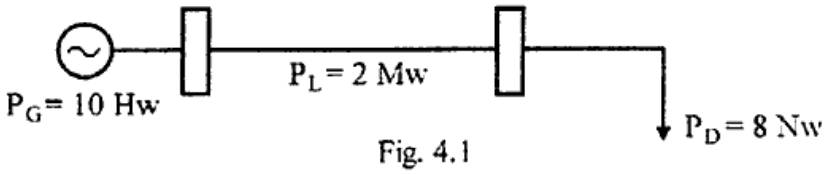

Fig. 4.1

5. a) Define various types of power and hence explain the philosophy of real and reactive power control. 7

b) Enlist various types of exciter and explain Brushless AC Excitation system in details. 6

OR

6. a) Derive the overall transfer function of AVR. 7

b) Explain static response of AVR loop. 6

SECTION – B

7. Draw the schematic diagram of a speed-governing system and explain its components. Hence, obtain the transfer function of a speed-governing system with its block diagram representation. 13

OR

8. a) Explain why it is necessary to maintain the frequency of the system constant. 5

b) A 100MVA synchronous generator operates on full load at a frequency of 50Hz. The load is suddenly reduced to 50MW. Due to time lag in governor system, the steam valve begins to close after 0.4S. Determine the change in frequency that occurs in this time. 8

9. a) Derive the transfer function model and block-diagram of tie line. 7

b) Explain Dynamic response of primary ALFC loop. 6

OR

10. a) Find the static frequency drop for the 2000MW system having initial load of 1000MW, R=2.4Hz/pu MW for one percent load increase. 6

b) Define the following terms: 7

1) Control area 2) Pool operation
3) Two area system 4) Tie-line bias control

11. a) Derive the expression for generator suing equation. 7

b) Explain the negative damping effect of damper winding. 7

OR

12. a) What is Power System stabilizer? State the application and need of Power System stabilizer. 7

b) Explain the concept of steady state instabilities. 7

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