B.E. Eighth Semester (Electrical & Electronics Engineering) (CGS)

10411 : Power System Operation & Control : 8 EX 01

P. Pages : 3

Time : Three Hours

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Max. Marks : 80

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) Explain the terms : **7**

i) Incremental fuel cost

ii) Incremental fuel rate.

How will you obtain incremental fuel rate from input - output characteristics of a given turbo generator unit.

b) The incremental fuel cost of two units of a plant are given by : **7**

$$\frac{dF_1}{dP_1} = 0.27\ P_1 + 50\ Rs/MWh$$

$$\frac{dF_2}{dP_2} = 0.18\ P_2 + 60\ Rs/MWh$$

Find incremental fuel cost corresponding to economical load allocation between the two unit if total load varies from 60 MW to 200 MW and minimum & maximum load on the unit are 25 MW & 125 MW respectively.

OR

2. a) Derive the transmission loss formula for two plant system. State the assumptions made. **7**

b) A constant load of 280 MW is supplied by two generator each of capacity 200 MW. The incremental fuel costs are **7**

$$\frac{dC_1}{dP_1} = 0.08\ P_1 + 15\ Rs/MWh$$

$$\frac{dC_2}{dP_2} = 0.10\ P_2 + 12\ Rs/MWh$$

Determine the most economical load division between the two generator.

3. a) Derive exact co-ordination equation for economic load scheduling including transmission losses. **7**

b) A system having two generating units connected through a line has following loss coefficients : **6**

$$B_{11} = 0.1 \times 10^{-2}\ MW^{-1}$$

$$B_{12} = -0.01 \times 10^{-2}\ MW^{-1}$$

$B_{22} = 0.13 \times 10^{-2}\ MW^{-1}$

Power is being dispatched economically with $P_1 = 120$ MW and $P_2 = 200$ MW find penalty factor of both units and system total demand.

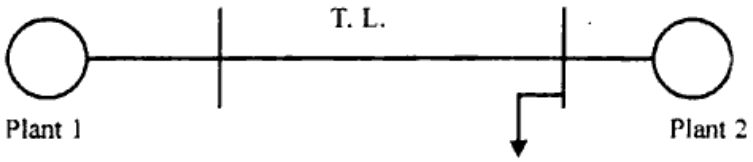
OR

4. a) A derive the expression for loss formula co-efficient for a simple system connecting two generating plants to a single load. 7

   b) A two plant system shown in fig. if 100 MW if transmitted from plant 1 to load, a transmission loss of 10 MW is incurred. Find the required generation for each plant and the power received by the load when system λ = Rs. 25 / MWh . The incremental fuel costs are given by - 6

$$\frac{dC_1}{dP_1} = 0.02 P_1 + 16 \text{ Rs / MWh}$$

$$\frac{dC_2}{dP_2} = 0.02 P_2 + 20 \text{ Rs / MWh}$$



5. a) Draw a block diagram of basic generator control loop. Explain its working. 7

   b) What is stability compensation in AVR loop ? How It can be done ? 6

OR

6. a) Draw and explain diagram of controllers employed to generator connected in a network of number of control areas. 6

   b) Explain dynamic performance of AVR loop by plotting root locus of AVR loop. 7

SECTION - B

7. a) Draw schematic diagram of turbine speed governing system. Explain the function of each component. 7

   b) Derive transfer function model of the following : 7
   i) Hydraulic valve actuator
   ii) Generator

OR

8. a) Two generator rated 200 MW and 400 MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively. From no load to full load. Assuming that generators are operating at 50 Hz at no load. How would a load of 600 MW be shared between them ? Assume pre-governor operation. 7

   b) Draw the block diagram of closing of ALFC loop and explain its working. 7

9. a) Derive the static response of primary ALFC loop. State the assumptions made. 7

   b) Explain the concept of pool operation what are its advantages. 6

OR

10. a) Explain two area control system with a neat block diagram. 7

    b) Explain the necessity of maintaining a constant voltage and frequency in power system operation. 6

11. a) Derive generator swing equation which it termed as GSE in case of single generator operation in an infinite bus. 7

    b) Explain in brief modern control application in power system. 6

OR

12. a) Explain the effect of damper winding on the performance of generator when it is subjected to shall disturbance. 7

    b) What are the power system stabilizers ? State their application in power system. 6

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