

POWER SYSTEM ENGINEERING

Time : 3 Hours

Min. Passing Marks : 24

Maximum Marks : 80

Instruction to Candidates :

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit-I

- (a) For a simple two unit system, the loss coefficient are $B_{11} = 0.001$ per MW, $B_{12} = -0.005$ per MW and $B_{22} = 0.0024$ per MW. The incremental production costs of two units are

$$\frac{dc_1}{dP_1} = 0.08P_1 + 16 \quad \text{and}$$

$$\frac{dc_2}{dP_2} = 0.08P_2 + 12 \text{ Rs / Mw-hr}$$

Find the generation P_1 and P_2 for $\lambda=20$. Also compute the transmission loss, received power and the efficiency of the transmission system. [8]

- (b) Derive and discuss the condition for economic loading of generating plants considering losses in transmission line. [8]

OR

- (a) Draw and discuss input-output curve for thermal generating unit. [8]

- (b) Find out the relation for 'Optimum generation scheduling' of power plant including transmission losses. [8]

Unit-II

- (a) Derive the Formula of synchronizing power coefficient. [8]

- (b) Derive an expression for the steady state stability limit of transmission line. What happens if the line is fully compensated. [8]

OR

- (a) Find out the power angle equation and power angle curve under steady state and transient conditions for a salient pole machine and compare. [8]

- (b) Find out the swing equation for a group of

- (i) Coherent condition

- (ii) Non coherent condition [8]

Unit-III

3. (a) Discuss the factor affecting the transient stability. How can transient stability be improved. [8]

- (b) How is transient stability affected by load increase and switching operations. [8]

OR

3. (a) With the help of equal area criteria, explain how the 'ARCB' and turbine fast valving help to improve the system stability. [8]

- (b) Explain the application of equal area criterion to study transient stability for a sustained line fault. [8]

Unit-IV

4. (a) Explain A.C. excitation system for synchronous machine in detail. [8]

- (b) Why is excitation control necessary in an alternate. [8]

OR

4. (a) What are spinning and maintenance reserve capacities? Explain how the reserve capacity of power station decided. [8]

- (b) Explain the Rotating thyristor excitation scheme with its block diagram. [8]

Unit-V

5. (a) Explain the use of series compensation of transmission lines and advantages and problems of series compensation. [8]

- (b) Explain working of a induction regulator. [8]

OR

5. Describe various types of thyristorised static VAR Compensator with their merits and demerits. [8]