Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(Pow Engg.)   (Sem.–1)
POWER SYSTEM OPERATION & CONTROL
Subject Code : PEE-501
Paper ID : [E0481]

Time : 3 Hrs.   Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :
1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

I)   a) What is an Optimal Power Flow problem? Discuss its problem formulation. What are the various methods to solve OPF problem.

b) Show that, for the most economic operation of a power plant having several generating units, the load must be divided among the units such that they all operate at the same incremental cost.

c) Explain, the various transmission effects and issues.   (10, 5, 5)

II) a) Compare load frequency and economic dispatch control.

b) Discuss in detail, the characteristics of steam and hydro units.   (10, 10)

III) What do you understand by '*Hydro-Thermal Scheduling*'? Discuss Lambda-Gamma iteration method for short-range fixed-head Hydro-Thermal scheduling.   (20)

IV) a) Discuss in detail about economy interchange between inter-connected utilities,

b) What are loss co-efficients? What do these co-efficients represent? Discuss the classical method to determine the B-coefficients for a n-bus system.   (10, 10)

V)   a) Discuss in detail, the Load frequency control with generation rate constraints,

b) What is a unit commitment problem? Discuss its problem formulation. Also, explain its significance. How is it different from economic dispatch problem?   (10, 10)

VI) a) Discuss in detail about the capacity interchange and diversity interchange.

b) What are cogeneration plants? Discuss any three types of cogeneration plants. What are the impacts of using cogeneration plants in a power system network?   (10, 10)

VII) a) The fuel inputs per hour of two plants are given as:

$$F_1 (P_{g1}) = (0.0085P^2_{g1} + 10.35\ P_{g1} + 240)\ Rs/h$$

$$F_2 (P_{g2}) = (0.0078P^2_{g2} + 10.83P_{g2} + 240)\ Rs/h$$

Determine the economic schedule using Newton Raphson method to meet the demand of 150 MW and the corresponding cost of generation using the classical method. The transmission losses are given by

$$P_L = 0.001P^2_{g1} + 0.002P^2_{g2} - 2 * 0.0002P_{g1}P_{g2}$$

b) What is decentralized control? Explain.

c) Discuss the application of gradient method to solve OPF problem.   (10, 5, 5)

VIII) Write short notes on the following :   (20)

a) Energy Banking.

b) Diversity Interchange.

c) Power Pools.

d) Turbine model.