May/April - 2016 AKB

Total Pages—4

(Set-R_1)

M.Tech-2nd (EE-PSE)
Power System Optimization

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 that is compulsory and any five from the rest

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2×10
   (*a*) Define economic load dispatch of power system.
   (*b*) What are different constraints in economic load dispatch ?
   (*c*) Explain how optimal loading is done when one generator exceeds its limit ?
   (*d*) What is the difference between the fixed head and variable head hydrothermal problem ?
   (*e*) Is Jacobian matrix symmetric ?

   (*f*) What are soft computing optimization methods used in power system ?
   (*g*) How are hydroplants classified ?
   (*h*) Describe the ε-constraint method for solving a multi-objective generation scheduling problem.
   (*i*) What do you mean by compromise solution in multi-objective optimization problem ?
   (*j*) What are the objectives in economic emission load dispatch problem ?

2. Two units in a steam station are operating all the time throughout the year. The maximum and minimum capacity of each plant is 125 MW and 20 MW, respectively. The incremental fuel cost characteristics for the plants are

$$\frac{dF_1}{dP_1} = Rs.(0{\cdot}20P_1 + 40) \qquad \frac{dF_2}{dP_2} = Rs.(0{\cdot}25P_2 + 30)$$

where, P_1 and P_2 are loads in MW. Find the optimal loading of generators for a load demand

of 130 MW and also find the saving in fuel cost in rupees per hour for the optimal scheduling of a total load of 130 MW as compared to equal distribution of same load between two units. 10

3. In a two bus system, load is connected near bus 2. If 100 MW is transmitted from plant 1 to the load, a transmission loss of 10 MW is incurred. Find the required generation of each plant and power received by the load when the system λ is 25 Rs/MWhr. The incremental fuel cost characteristics for the plants are

$$\frac{dF_1}{dP_1} = Rs.(0{\cdot}02P_1 + 16) \qquad \frac{dF_2}{dP_2} = Rs.(0{\cdot}04P_2 + 20)$$

Where, P_1 and P_2 are loads in MW. Find the optimal loading of generators for the power received by load above (*a*) when losses are included but not co-ordinated (*b*) when losses are co-ordinated. Also find the saving in fuel cost in rupees per hour when losses are co-ordinated. 10

4. Describe the economic dispatch problem using the approximate Newton Raphson method. Develop the computer algorithm for its solution. 10

5. Write down the algorithm for long range hydrothermal scheduling problem using Newton Raphson method. 10

6. (*a*) Explain the weighted sum method in multi-objective thermal generation scheduling. 5
   (*b*) Explain how to get best compromise solution using decision making function. 5

7. Write doen the algorithm for multi-objective thermal power dispatch using ε-constraint method. 10

8. Write short notes on : 5+5
   (*i*) Stochastic economic emission load dispatch
   (*ii*) Surrogate worth trade-off method for multi-objective generation scheduling.
