Exam.Code:1017
Sub. Code: 7780

1128
M. E. Electrical Engineering (Power Systems)
First Semester
EE-8102: Power System Operation and Control

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt any five questions.

x-x-x

Q1. A) A power station has to meet the following demand:

Group A: 200 KW between 8 A.M. and 6 P.M.
Group B: 100 KW between 6 A.M. and 10 A.M.
Group C: 50 KW between 6 A.M. and 10 A.M.
Group D: 100 KW between 10 A.M. and 6 P.M. and then between 6 P.M. and 6 A.M. Plot the daily load curve and determine (i) diversity factor (ii) Units generated per Day (iii) load factor. (7)

B) Explain Briefly why we need reserves in operation of power systems. (3)

Q2.A) Explain in detail the parallel operation of two generators with relevant droop characteristic graphs.(6)

B) Explain the load frequency control of a single area system. (4)

Q3. A) Derive the expression for tie line power and frequency for a two area system. (5)

B) Derive the coordination equation for economic dispatch with and without losses. (5)

Q4. Consider the two-plant case with the steam-plant characteristics with $F = 700 + 4.8\ P_S + (P_S^2/2000)$ Rs/hr for $200 = P_S <= 1200$MW. The hydro unit is a constant head plant with $q = 290 + 10\ P_h$ for $P_h > 0$ and $q = 0$ for $P_h = 0$. There is no spillage and the initial volume is 10,000 acre-ft. The discharge rate is in acre-ft/hr. Storage volume limits are 6000 and 16,000 acre-ft. The natural inflow is 860 acre-ft-hr. The scheduling problem is to be examined for six hours and individual periods taken as three hours each. The loads for the time periods are 600 and 1000MW respectively. Find the hydro-thermal schedule. (10)

Q4. In power system having two units, the loss co-efficient are

$B_{11} = 0.0015 MW^{-1}$, $B_{12} = -0.0006 MW^{-1}$

$B_{21} = 0.0006 MW^{-1}$, $B_{22} = 0.0024 MW^{-1}$

The incremental production costs of the units are $= 0.08P_{G1} + 20$ Rs/MWhr

$= 0.09P_{G2} + 16$Rs/MWhr.

Find the generation schedule for $\lambda = 20$ and 25. Find also change in transmission loss between two schedules. (10)

Q5. Discuss the short term hydro-thermal scheduling problems and discuss how the problem is solved by Lamda– Gamma and iteration method. (10)

Q6. Explain various state transitions and control strategies using state transition diagram. (10)

Q7. A) The fuel inputs per hour of plants 1 and 2 are given as

$F_1 = 0.2\ P_1^2 + 40\ P_1 + 120$ Rs/Hr

$F_2 = 0.25\ P_2^2 + 30\ P_2 + 150$ Rs/Hr

Determine the economic operating schedule and the corresponding cost of generation if the maximum and minimum loading on each unit is 100 MW and 25 MW. Assume the transmission losses are neglected and the total demand is 180 MW. Also determine the saving obtained if the load is equally shared by both the units. (5)

B) Draw the block diagram to show the hardware configuration of a SCADA system for a power system and explain the app. (5)

Q8. Explain the concept of Energy control Centre or load dispatch centre. Also discuss its functions. (5)

B) Explain the various operating states of power system. Also discuss the state transitions and control strategies. (5)

x-x-x