M.E. POWER ENGINEERING FIRST YEAR SECOND SEMESTER - 2017

POWER SYSTEM PLANNING AND OPERATION

TIME: THREE HOURS   FULL MARKS: 100

Answer any five questions

1. Explain the following terms:
(i) must run unit (ii) minimum up time and minimum down time (iii) transitional cost
(iv) long-term and short-term hydro scheduling (iv) production cost

                                                       3+5+4+5+3

2. a) What is load forecasting?   4
b) Describe short-term load forecasting and long-term load forecasting.   16

3. Discuss briefly about hydropower plant.   20

4. Give a note on optimal power flow.   20

5. Discuss briefly about power system planning.   20

6. Discuss briefly about the solution of unit commitment problem using Dynamic Programming.   20

7. A two-plant hydrothermal system has the following characteristics:
(i) Fuel cost as a function of active power generated at the thermal plant is
$$F = 2.7P_1 + 0.003P_1^2 \text{ \$/h}$$
(ii) The transmission losses are given by
$$P_L = 1.43 \times 10^{-4} P_2^2$$
(iii) The rate of water discharge as a function of active power generated at the hydro plant is
$$q_2 = 2380 + 60P_2 \text{ cfs}$$
(iv) The following table gives the system's power demand and optimal incremental costs.

Duration (h)	P_D (MW)	λ
14	700	3.911
10	450	3.627

It is required to calculate the optimal active power generated by each of the plants in each of the subintervals, the system power losses, the water conversion coefficient v, and the allowable volume of water discharged at the hydro plant.   20