

(Time: 3 Hours)

Total Marks - 80

- N.B.:-** (1) Question No.1 is compulsory.
 (2) Attempt any **three** questions out of remaining **five** questions.
 (3) Assume necessary data wherever necessary.

1. Attempt the following 20
 - a) State the objectives of transmission system planning.
 - b) Draw bath tub curve and define all three regions in it.
 - c) Show that M.T.T.F. is reciprocal of failure rate λ
 - d) What is operating reserve. Define Outage Replacement Rate (O.R.R.)

2.
 - a) Describe the various data requirements for composite system reliability evaluation. 10
 - b) Explain frequency and duration method and hence explain the concept of rate of departure. 10

3.
 - a) Differentiate in Short term, Medium term and Long term planning. 10
 - b) Explain two state Markov model and derive the expression of availability and unavailability. Draw the state space model for three units indicating all transition rates. 10

4.
 - a) A generating system consists of the following units: 10
 - 1*10MW units with FOR of 0.08
 - 1*20MW units with FOR of 0.08
 - 1*30MW units with FOR of 0.08
 - 1*40MW units with FOR of 0.08

Calculate LOLE for this system for a single daily peak load of 60MW.
 - b) A generating system contains 3*25MW units each with a 4% FOR and 1*30MW unit with a 5% FOR. If the peak load for a 100 day period is 75MW, what is the LOEE for this period? Assume that the appropriate load characteristic is a straight line from the 100% to the 80% points. 10

5.
 - a) Explain PJM method in detail 10
 - b) What is reactive power planning? What are the methods used for reactive power planning? 10

6.
 - a) Explain in details various factors affecting generation planning? 10
 - b) What is Load forecasting? Describe different techniques used for load forecasting. 10