

(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  $\lambda$
  - 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