

- N.B. : (1) Question No.1 is compulsory.
 (2) Attempt any three questions out of remaining questions.
 (3) Figures to the right indicate full marks.
 (4) Assume suitable data if necessary.

1. Attempt any Four : 20
- 3-A (a) Draw Bath Tub curve and define all three regions in it. (N) 4
 (b) State the objectives of Generation system planning.
 N I (c) What is operating reserve? Define Outage Replacement Rate (O.R.R.)
 (d) Explain Load growth characteristics in detail.
 (e) A system consists of four components in parallel. What is the reliability of each component if the overall system reliability is 0.9. What is the system reliability if five such components are connected in parallel.
2. (a) Describe the various data requirements for composite system reliability evaluation. 10
 (b) What is Load forecasting ? Describe different techniques used for load forecasting. 10
3. (a) Explain frequency and duration method and hence explain the concept of rate of departure. $4-30 \tau$ 10
 3 (b) What is reactive power planning? What are the methods used for reactive power planning? 10
4. (a) Consider a system containing five units of 40 MW each with a forced outage rate of 0.01. Prepare the capacity outage table for the system. Find Loss of Load Expectation (LOLE) and risk factor if the annual peak load is 160 MW and base load is 40% of peak load. 10

- (b) Derive a general expression for the unreliability of model shown in figure below and hence evaluate the unreliability of the system if all component have a reliability of 0.9. 10

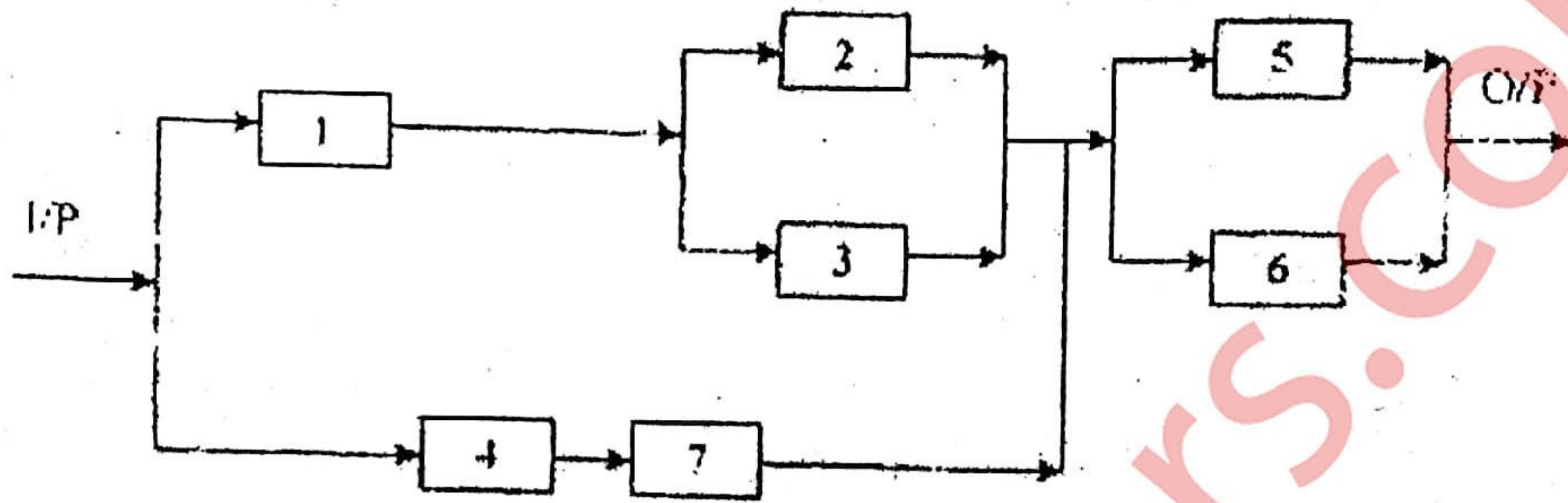


Figure for Q.4b

5. (a) Explain PJM method in detail. 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
6. (a) What is meant by Outage ? What are reasons behind forced outage and explain forced outage rate ? 10
 (b) Differentiate in Short term, Medium term and Long term planning. 10