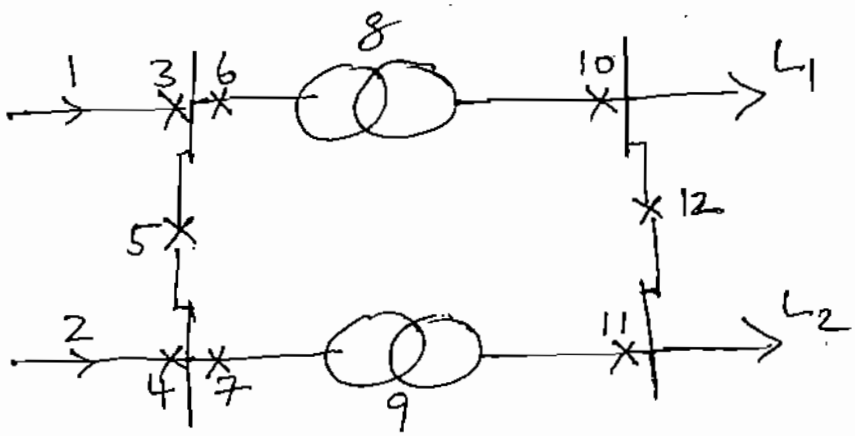
EEL-799 POWER SYSTEM RELIABILITY MAJOR 29/4/2008

1) Two generation systems are interconnected by TWO 80 MW Tie-lines. System-A has THREE 200MW units with FOR's of 10%. System-B has TWO 200 MW units with FOR's of 10% and ONE 400MW unit with a full cap FOR of 10% and a Derated State of 200 MW with a probability of 20%. The load on each system is 500 MW. The two tie-lines have failure rates of 5 f/year and average repair times of 24 hours each. Calculate the $LOLE_{AB}$ of the System.

2) What is meant by the PLOC condition experienced by a Distribution System? Describe the model, data used and calculation procedure used in the PLOC Index evaluation.

3) Identify the various Total Failure and Active Failure Modes w.r.t. the load points L_2 in the following Substation layout and indicate how the overall λ, r, U for the Load Point L-2 are calculated.



(PTO)

4) A thermal power plant unit has normally 2 Feed water (FW) pumps running and 1 FW pump available as spare. The failure rate, repair rate and Installation rate of each of these FW pumps are λ, μ and γ respectively, Draw the state-space diagram of this system. Form the necessary equations and indicate how the probabilities of being in any of the states can be found out. (Hint: Use the Stochastic Transitional Probability matrix for evaluating the long-term (steady state) probabilities of all the states).

5) a) Explain the significance of the Unit Commitment Risk computed in the operational reliability analysis of a system.

b) List the steps involved in the Unit Commitment Risk Computation of an operating system when rapid start units and hot reserve units are available in standby mode, with explanation on how the risks are calculated in the different time periods of the problem.

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