8. Write short notes on any two of the following:

   a) Frequency and load duration method

   b) Distribution system reliability evaluation for radial system with imperfect switching

   c) Monte-Carlo simulation based network reliability evaluation

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Total No. of Questions :8]   [Total No. of Printed Pages :4

Roll No ....

MTPA-201
M.E./M.Tech., II Semester
Examination, December 2015
Reliability Evolution of Power System
Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.
   ii) All questions carry equal marks.

1. Establish a mathematical relationship of the reliability function. What are its properties? Develop its relation with density function, distribution function, reliability, failure rate and hazard rate.

2. What are the popular probability distributions for reliability analysis? Define them when are they used? Give their important properties and characteristics.

3. a) A random sample of 15 valves is observed. From past experience, it is known that the probability of a given failure within 500 hours following maintenance is 0.18. Calculate the probability that these valves will experience 0, 1, 2, ..., 15 independent failures within 500 hours following their maintenance.

rgpvonline.com ~~lamps~~ are placed under life test. The test is terminated at $t_0 = 850$ hours. Eight components fail before 850 hours have elapsed. Determine the accumulated component hours and an estimate of the failure rate and MTTF for the following situation.

   i) The components are replaced when they fail.

   ii) The components are not replaced when they fail.

   The failure times obtained are : 183, 318, 412, 432, 553, 680, 689 and 748.

4. Consider the circuit below:
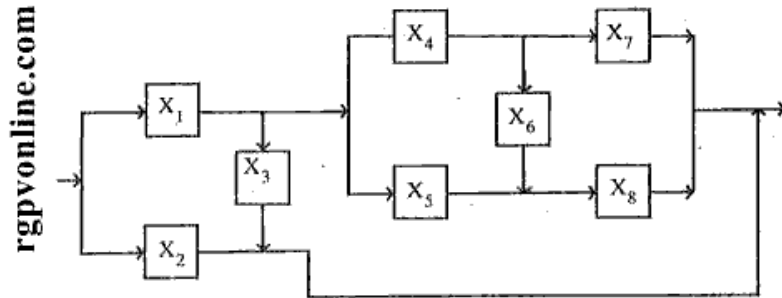
Find the following:

i) Minimal path sets

ii) Minimal cut sets

iii) Reliability of the system at 1000 hours

iv) Probability of failure at 1000 hours, using cut-sets, to very results from (iii)

v) Accuracy of the results of (iv) and/or (iii), using an approximate method.

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5. a) Assume all components of the system shown in figure 2. are repairable (revealed fault) with a failure rate of 10^{-3} (hour^{-1}) and a mean down time of 15 hours. Component 7 has a failure rate of 10^{-5} (hours^{-1}), with a mean down time of 10 hours. Calculate the average system unavailability.
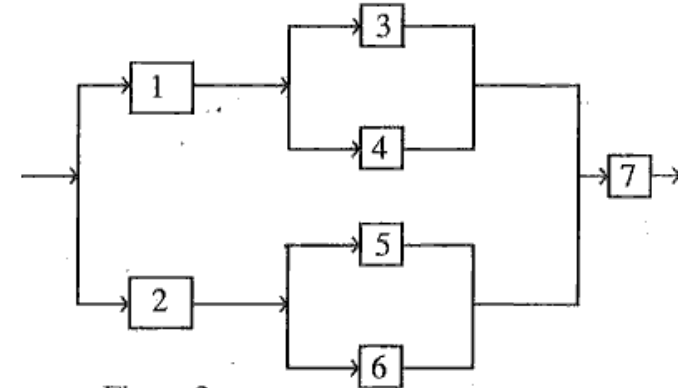

Figure 2

   b) Describe the step by step procedure of the state enumeration method for finding the solution of the state-space model of any system.

6. A system that consists of two cooling units has the three states. When one unit system fails, the other system takes over and repair on the first starts immediately. When both systems are down, there are two repair crews to simultaneously repair the two systems.
   a) Determine the probability of each state.
   b) Determine the availability of the entire system.

7. A generation system consists of four identical units each of 50MW capacity. The maximum load is 150MW. The load duration curve may be assumed to be a straight line with a load factor of 50%. F.O.R. for each unit is 0.05. Determine the loss of load probability.