

FACULTY OF ENGINEERING

B.E. 4 / 4 (E & EE) II – Semester (Main) Examination, May / June 2011

Subject: Power System Reliability (Elective – III)

Time: 3 Hours

Max. Marks: 75

Note: Answer all questions from Part A. Answer any Five questions from Part B.

PART – A (25 Marks)

1. Given that $P\{x\} = 0.32$; $P\{y\} = 0.44$ and $P\{XUY\} = 0.58$. Calculate $P\{X / Y\}$. 2
2. The probability of success in a single trial is 0.1. Calculate the probability that in 10 trials there will be exactly two successes using Poisson distribution. 3
3. Define reliability of a system. 2
4. A two component series system contains identical components each having a reliability of 0.99. Evaluate the reliability and unreliability of the system. 3
5. Draw the state space diagram for three identical components system. 2
6. What is the difference between discrete Markov chains and continuous markov process? 3
7. Define forced outage rate of a generation system. 2
8. Draw the state space diagram for the two-level representation of the daily load. 3
9. Define SAIDI and SAIFI. 2
10. Write the importance of reliability analysis of a distribution system. 3

PART – B (50 Marks)

- 11.(a) Define Random variable, density and distribution functions. 3
 (b) Deduce the relationship between Poisson distribution and binomial distribution. 7
- 12.(a) Define hazard rate and MTTR. 3
 (b) A system consists of four components in parallel system success requires that at least three of these components must function. What is the probability of system failure if the component reliability is 0.87? 7
13. The following Stochastic transitional probability matrix P shows the transition rates in per hour of a continuous Markov Process. 10

$$P = \begin{matrix} & \begin{matrix} 1 & 2 & 3 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} & \begin{bmatrix} .90 & .05 & .05 \\ 0 & .95 & .05 \\ 0 & 0 & 1 \end{bmatrix} \end{matrix}$$
 - a) Construct state space diagram and discuss particular features of it.
 - b) Evaluate the MTTF given that the system starts in state 1.
 - c) Derive the differential equations for the system.

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14. A generating system consists of four generating units. Where units 1, 2 and 3 have a capacity of 20 MW and unit 4 a capacity of 40 MW. For each unit, the failure rate λ is 0.4 yr^{-1} and the repair rate μ is 9.6 yr^{-1} . Obtain the capacity outage probability table and draw the state space diagram. 10
- 15.(a) Explain common mode failures. 7
- (b) Define ENS and AENS in a distribution system. 3
- 16.(a) Explain bath tub curve. 5
- (b) Obtain the reliability of a system shown in Fig. 1.

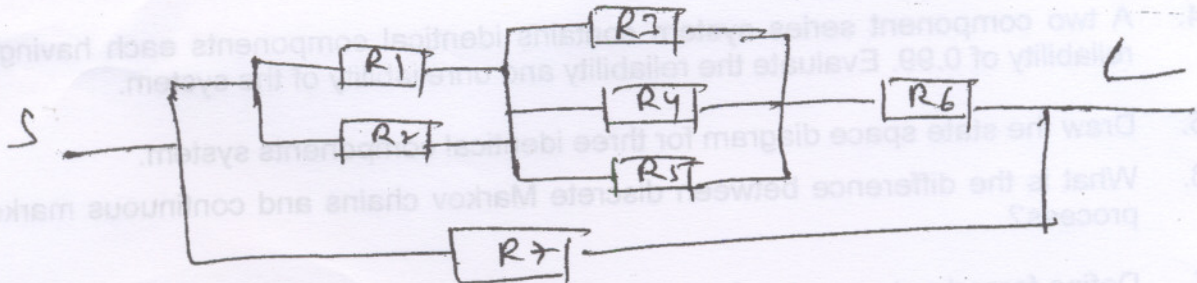


Fig-1.

17. Write short notes on any two.
- Exponential distribution
 - LSP matrix
 - Unit removal process.