Code No: 138GU **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, December - 2020
RELIABILITY ENGINEERING
(Common to CE, EEE)

Time: 2 Hours **Max. Marks : 75**

Answer any Five Questions
All Questions Carry Equal Marks
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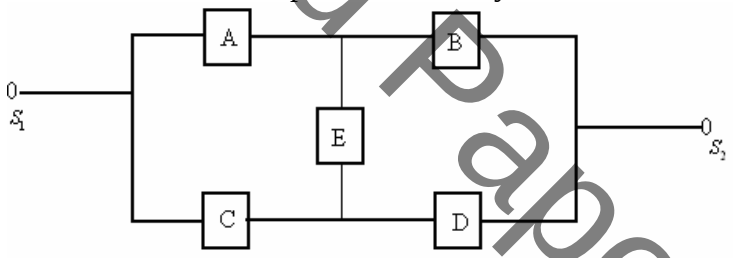
1.a) A random sample of 4 is to be selected from a lot of 10 articles 3 of which are defective. What is the probability that the sample will contain exactly 1 defective?
b) The time to wear for a cutting tool is distributed normally with a mean of 2.8 hour and standard deviation of 0.6 hour. Find
i) The probability that the tool will wear out in 1.5 hours
ii) Find out the reliability for 1.5 hours
iii) How often the cutting edge of the tool must be replaced in order to keep the failure less than 10 percentage? [7+8]

2.a) Explain weibull distribution.
b) Define probability density and distribution functions. [7+8]

3. How would you calculate the reliability of the bridge Network using Tie Set method as shown in figure below. If each component reliabilityis0.9? [15]



4. Define cutest and explain partially redundant systems with an example. [15]

5.a) Explain reliability equation of series system with exponential distribution.
b) A manufacturing company operates two production lines when both lines are operating; the production rate on each line is 500 units per hour. At this production rate the failure rate of line 1 is 3 failures per 8-hr day (CFR) and the failure rate of line 2 is 2 failures per 8-hr day. When one line fails, the production rate of the second line must be increased in order to make production quotas. At the increased rate of 800 units per hour, the failure rate of line 1 is 6 per 8 hr day and the failure rate of line is 3 per 8-hr day. Find the reliability and the MTTF and the reliability of the production system over a 1 hr and over an 8 hr production run. [7+8]

6.a) Define hazard rate and failure.
b) Derive expressions for MTTF of series and parallel systems. [7+8]

7. How would you explain two-state Markov process (Single component with repair) and derive the equations for steady state probabilities? [15]

8. What is frequency balance approach? Explain Cut set approach/Common mode failures modeling for reliability evaluation? [15]

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