19P453 (Pages: 2) Name: ……..…...

Reg. No……..

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, APRIL2021

(CBCSS-PG)

CC19P MST4 E08 - RELIABILITY MODELING

(Statistics - Elective Course)

(2019 Admission - Regular)

Time: Three Hours Maximum: 30 Weightage

Part A

Answer any ***four*** questions. Each question carries 2 weightage.

1. Define dual. What is the dual of k out of n system?
2. Define minimal path and minimal cut set. How can we represent a coherent system using minimal path and cut expression?
3. What are different criteria for identification of IFRA classes of life distribution?
4. Distinguish between Type I and Type II censoring.
5. What are different types of accelerated life testing procedures?
6. What is Availability and limiting availability?
7. Define Bivariate exponential distribution. What is the lack of memory property?

(4 x 2 = 8 Weightage)

Part B

Answer any ***four*** questions. Each question carries 3 weightage.

8. If $\varphi(x_1, \dots, x_n)$ be the structure function of a coherent system of n components. Show that $\prod_{i=1}^{n} x \leq \varphi(x_1, \dots, x_n) \leq \coprod_{i=1}^{n} x_i$. Find the corresponding reliability bounds.
9. Show that reliability function $h(\boldsymbol{P})$, where $\boldsymbol{P}=(p_1,\dots,p_n)$ is increasing in p_i, $i=1,2,\dots,n$.
10. If F_1 and F_2 are IFR distributions, show that their convolution is also IFR distribution.
11. Discuss failure rate property of a Gamma distribution.
12. Explain Univariate Poisson shock model if distribution of size of the shock is i.i.d.
13. Define reliability importance of components. Obtain the reliability importance of series and parallel system of three components with $p_1=0.2$, $p_2=0.2$, $p_3=0.3$.
14. Give failure rate properties of Weibull distribution.

(4 x 3 = 12 Weightage)

Part C

Answer any two questions. Each question carries 5 weightage.

15. Show that life distribution is exponential distribution if and only if it has constant failure rate.

16. Explain reliability growth testing. Explain the non-parametric estimation of Censored ungrouped data.
17. Show that IFRA property of life distributions are preserved under formation of coherent system.
18. Explain the testing of homogeneous Poisson process (HPP) Vs non-homogeneous Poisson process (NHPP).

(2 x 5 = 10 Weightage)

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