18P451 (Pages: 2) Name…….……

Reg. No……..

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2020

(CUCSS - PG)

(Regular/Improvement/Supplementary)

CC15P ST4 E04 – RELIABILITY MODELING

(Statistics)

(2015 Admission onwards)

Time: Three Hours Maximum: 36 Weightage

Part A

Answer ***all*** questions. Each question carries 1 weightage.

1. Define coherent system. Give example.
2. Explain modular decomposition of a coherent system.
3. Define reliability of a system.
4. What are minimal cuts and minimal paths?
5. Discuss the shape of a system reliability function.
6. Define failure rate function. Give example.
7. Show that Exponential distribution posses lack of memory property.
8. Define NBU property.
9. Explain Poisson shock model.
10. Describe dispersive ordering.
11. Define availability.
12. What is accelerated testing?

(12 x 1 = 12 Weightage)

Part B

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

13. Show that reliability function is increasing with increase of components reliability.
14. Obtain mini-max bounds for system reliability.
15. Define bathtub shaped failure rate model. Obtain the failure rate behaviour of Weibull distribution.
16. If $X \sim U(0,1)$, show that -logX follows exponential distribution.
17. Define Poisson process. Explain non-homogeneous Poisson process and its applications in reliability.
18. Describe censoring. Give the method of non-parametric estimation of reliability in censored case.

19. Explain accelerated life testing procedures.
20. Define availability, average availability and limiting availability. Establish the relationship between them.
21. Define Bivariate exponential distribution. Obtain its marginal distributions.
22. Explain Hollander-Proschan test for exponentiality.
23. Establish the relationship between IFR, IFRA, NBU, NBUE.
24. Describe Poisson shock model for iid distributed damage size.

(8 x 2 = 16 Weightage)

Part C

Answer any ***two*** questions. Each question carries 4 weightage.

25. Show that IFR property is preserved under convolution.
26. State and prove necessary and sufficient condition for holding NBU and NBUE property under convolution.
27. Explain Reliability Growth testing. Describe non-parametric estimation of censored grouped and ungrouped data.
28. Show that Bivariate Exponential distribution is the only bi-variate distribution with lack of memory property.

(2 x 4 = 8 Weightage)

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