

1 (a) Define hazard function. For a life time model
 $f(x; \theta, \beta) = \frac{\theta^\beta e^{-\theta x}}{\Gamma(\beta)} x^{\beta-1}$, $x > 0$, $\theta, \beta > 0$; show that
 hazard function is increasing function of time
 when $\beta > 1$.

(b) Define Type I and Type II censoring. Show that
 for exponential distribution with mean θ , $\theta > 0$, the
 likelihood function becomes maximum at

$$\hat{\theta} = \frac{T}{r}, \quad T = \sum_{i \in D} T_i + \sum_{i \in C} L_i$$

where r is the number of observed failure, D and C
 denotes the sets of individuals with $T_i = \min(x_i, L_i)$
 and x_i is the actual life time. L_i is the censoring
 time.

1 (a) Discuss Weibull life time model. Describe the
 regression approach due to White (1969) to estimate
 the parameters of the model. OR

(b) Define mtbf, mttf. Obtain an expression for
 mtbf based on reliability.

2 (a) Describe progressive type I censoring. Obtain the
 general form of the composite distribution function
 and the likelihood function under such censoring
 scheme.

(b) For exponential life time model obtain MLE of
 parameter θ , mean of the model under progressive
 type I censoring in two stages.

2 (a) In case of type II progressive censoring without
 replacement obtain MLE of θ , mean of exponential
 life time model for k -stages. Hence find $E(\hat{\theta})$.

(b) For the problem given in the 2(a) above show how would you test the hypothesis of $H_0: \theta = \theta_0$ versus $H_1: \theta \neq \theta_0$ Obtain asymptotic confidence interval for θ with $(1-\alpha)$ confidence coefficient.

3 (a) What is structure function? Write structure function for the series in parallel system. Hence find out the expression for its reliability.
(b) Discuss the Bates probability approach to obtain the reliability of a bridge structure.

OR

3 (a) Describe k-out of n system. Obtain reliability for the series and parallel systems from the reliability of k-out of n systems.
(b) Develop a general expression for reliability of a standby system with imperfect sensing and switching in case of exponential life time model.

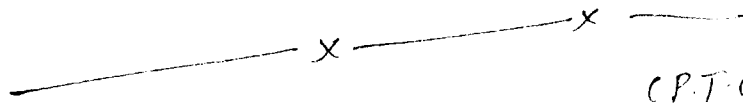
4 (a) How will you estimate survival function when the data are given in the form of life tables. Suggest the modified form of the estimate and explain the procedure for its derivation.
(b) For uncensored data how will you obtain one sided interval estimate of the survival function.

OR

4 (a) What is accelerated life testing? What is its need? Discuss with suitable examples.
(b) What is goodness of fit problem? Discuss different goodness of fit tests in case of uncensored data.

5 Write notes on any two: EG 2-3

- (a) Discrete life time model.
- (b) Minimal cut/path method for system reliability
- (c) Cold and Hot standby systems
- (d) Determination of sample size with minimizing cost in case of Type II censoring with and without replacement.



(P.T.O)