## Frequently asked questions:

1. Why do we study reliability theory?

**Answer:** Any system or components of any system that is operating is subject to failure. Study of the failure process of the systems through quantitative basis will help us to understand the complex system and thereby helps us to take appropriate decisions.

## 2. What is the meaning of reliability in the subject of study?

**Answer:** The term reliability is used generally to express a certain degree of assurance that a device or a system will operate successfully in a specified environment during a certain time period.

3. What is the difference between quality and reliability?

**Answer:** Quality is the acceptable standard of something as defined by them whereas reliability is the degree of failure free condition in a specified environment for a specified time. Even when quality is measured over time it is compared with the same standard measure and reliability changes over time.

- What is the difference between probability distributions and life distributions?
  Answer: Probability distributions are general terminology. Life distributions are probability distributions used for such random variables which represent life time of items /components/systems.
- 5. Distinguish between density function and reliability function.

**Answer:** If f(t) and  $\lambda(t)$  represent density function and reliability function, then f(t)dt is the unconditional probability of time to failure of the system in the time interval (t, t+dt], whereas  $\lambda(t) dt$  is the conditional probability of time to failure of the system in the time interval (t, t+dt], given that the system has not failed from time origin up to time  $t, t \ge 0$ .

- 6. Distinguish between parallel system and series system.
  - Answer : The components of a system may be arranged in series or parallel configurations. That is, a series system works only when all their components work in a system. Failure of any one component will make the system is not operative. Whereas, a parallel system works if at least one of their components work in a system. Failure of the system occurs only when all the components fail.
- 7. When we can use exponential distribution for lifetime of a system or component? Answer : If the failure of a system or component does not depend on how long it has been used, then we can use exponential distribution. In such cases failure occurs because of external damages or shocks, which could occur accidently. For example, electronic components.
- Which distribution has decreasing or increasing or constant hazard function?
  Answer :Weibull distribution can representing all of these. For certain parameters this distribution represent decreasing failure rate, for some it is increasing and for a specific parameter the failure rate or hazard function is constant.
- How can we use discrete distributions for failure phenomenon as time is continuous?
  Answer : Suppose that we could observe the system only at discrete time points only, and we need to model the failure only at these time points then we can use discrete distributions.
- 10. How the hazard function and distribution function determine each other?

**Answer** : Given distribution function F(x), the hazard function  $\lambda(t)$  satisfy the relation,

$$\lambda(t) = \frac{F'(t)}{1 - F(t)} \quad \text{for all } t \ge 0$$

Given the hazard function  $\lambda(t)$ , distribution function F(x) satisfy the relation,

with 
$$F(0) = 0$$
,  $F(t) = 1 - \exp\left(-\int_{0}^{t} \lambda(x) \, dx\right)$ .