# **Frequently Asked Questions**

- What do you mean by Gradual failure? Answer: Gradual failure is progressive in nature. That is as the life of an item increases, its
- 2. What are the results of gradual failure?

operational efficiency also deteriorates.

#### Answer:

The results of gradual failure are: Increased running (maintenance and operating) costs, Decrease in its productivity and Decrease in the resale or salvage value.

3. What do you mean by sudden failure?

#### Answer:

**Sudden failure:** This type of failure occurs in items after some period of giving desired service rather than deteriorations while in service. The period of desired service is not constant but follows some frequency distribution which may be progressive, retrogressive or random in nature.

4. What is progressive failure?

#### Answer:

**Progressive failure:** If the probability of failure of an item increases with the increase in its life, then such a failure is called a progressive failure.

For example, light bulbs and tubes fail progressively.

#### 5. What is retrogressive failure?

#### Answer:

**Retrogressive failure:** If the probability of failure in the beginning of the life of an item is more but as time passes the chances of its failure become less, then such failure is said to be retrogressive.

6. What is random failure?

# Answer:

**Random failure:** In this type of failure, the constant probability of failure is associated with items that fail from random causes such as physical shocks, not related to age. For example, vacuum tubes in air-born equipment have been found to fail at a rate independent of the age of the tube.

7. What do you mean by mortality table? **Answer:** 

Mortality tables are tables used to derive the probability distribution of life span of equipment in question.

8. What is mortality theorem?

# Answer:

**Mortality theorem:** A large population is subject to a given mortality law for a very long period of time. All deaths are immediately replaced by births an there are no other entries or exits. Show that the age distribution ultimately becomes stable and that the number of deaths per unit time becomes constant and is equal to the size of the total population divided by the mean age at death.

9. What is descrate's sign rule?

## Answer:

According to the Descrate's sign rule all other roots  $\alpha_1, \alpha_2, ..., \alpha_k$  will be negative and their absolute value would be less than unity, that is absolute  $\alpha_i$  less than 1, where I is equal to 1, 2, ..., k. it follows that the value of these roots tends to zero as t tends to infinite, with the result that it becomes f(t) is equal to  $A_0$ .

10. What do you mean by individual replacement policy?

## Answer:

**Individual replacement policy:** Under this policy an item (or equipment) is replaced just after its failure in the given system. This ensures smooth running of the system.

11. What do you mean by group replacement policy?

# Answer:

**Under a group replacement policy items are replaced:** (i) individually as and when they fail during a specified time period, (ii) in groups at the end of some suitable time period, without waiting for their failure, with the provision that if any item fails before the time specified, it may be replaced individually.

12. What things are kept in record while calculating the optimal time period?

## Answer:

The decision- maker will call a time period optimal for which the total cost incurred is the minimum. In order to calculate this optimal time period for replacement he has to keep record of,

- 1. Probability of failure
- 2. Loss incurred due to these failures

- 3. Cost of individual replacement and
- 4. Cost of group replacement
- 13. Where is group replacement suitably used?

## Answer:

The group replacement policy is suitable for a large number of identical low cost of items that are likely to fail with age and for which it is difficult as well as not justified to keep the record of their individual ages.

14. What do you mean by staffing problem?

## Answer:

Staffing problem are replacement problems that are related to human beings working in an organization. The principles of replacement may be applied to formulate some useful recruitment and promotion policies for the staff working in an organization.

15. How is rate of replacement of time calculated?

# Answer:

**Rate of replacement at time t :** The number of failures at any time t is F(t) is equal to np(t) plus summation of p(x) F(t-x), where t is less than equal to L, summation p(x) F(t-x), where t is greater than L.