

1. Distinguish between Chance variation and Assignable variation.

Chance Variation	Assignable Variation
<ul style="list-style-type: none"> * The variation in the quality of the product which occurs due to some natural or random causes which may affect the process output in minor ways. * Though no method is available by which it can be controlled or eliminated. 	<ul style="list-style-type: none"> * The variations that occurs due to the Non-random causes like poor quality of Raw material, machine, operator or any other component of the process. * Assignable variation can be eliminated, if detected early during the production process.

2. Define process and product control.

Process Control

This means the control of the process of the goods while they're in the process of production.

Product Control

Here the quality of the product is controlled when the product is ready to dispatch or to sell to the customers.

3. Explain briefly the types of Control charts for attributes.

- * C-chart (no. of defects in a unit)
- * np-chart (no. of defectives - Sample size need not be same)
- * p-chart (proportion of defectives - all the samples are of same size).

C-chart

It is required to control the no. of defects per unit for the construction of c-chart, a record of the no. of defects in each of the "N" articles inspected should be known.

$$\text{Average No. of defects } \bar{c} = \frac{\text{Total No. of defects}}{\text{No. of items}}$$

np-chart

If the proportion of defectives in the population of items produced is " p ". ~~The~~ The no. of defectives in a sample of size " n " is " x ". then $X \sim B(np, \sqrt{pqn})$. When " n " is sufficiently large when neither p nor q is very small.

$$\bar{p} = \frac{\text{Total percentage of defectives}}{\text{Total no. of items}}$$

$$\bar{n} = \frac{\text{Total no. of sample size}}{\text{No. of sample}}$$

P-chart

Under the same assumption as those for np-chart and when all the samples are of same size, uses p-chart.

4. What is control chart?

* A control chart is ~~des~~ designed to display successive measurements of a process with a centre line and control line limits.

* The control chart helps us to decide whether the process of production is in control or not.

5. What is meant by Statistical Quality Control?

SQC is a statistical method for finding whether the variation in the quality of the product is due to the Random causes or assignable causes.

6. Distinguish between defects and defective.

Defects	Defectives
<ul style="list-style-type: none">* Defects refer to any imperfection, fault or non-conformance in a product or expected standards of quality.* Defects can arise at any stage of the production process and may include issues such as incomplete assembly, incorrect dimensions.	<ul style="list-style-type: none">* Defective refers to a product or services that has one or more defects and does not meet the required standards of quality.* Defective is a broader term that describes a product or services that does not meet the required standards of quality due to one or more defects.

7. Discuss the merits and demerits of p-chart.

Merits

- * It is a simple control chart to interpret and provides an easy way to track the fraction of nonconforming items in a population.
- * It can be used to compare different populations of items with one another and to determine whether an improvement has been made.
- * It allows for the use of statistical process control to monitor quality performance over time.

Demerits

The control limits on a traditional p-chart become narrower when your subgroups are larger. If your subgroups are large enough, overdispersion can cause points to appear to be out of control when they are not.

8. Define Producer's risk and Consumer's risk

Producer's risk

It is the risk of rejecting the lot of good quality products based on the sample having bad quality.

Consumer's Risk

It is the risk of accepting the lot of bad quality products based on the sample having good quality.

9. Mention any two uses of Statistical quality control.

* SAC does not involve inspecting each and every item produced for quality standards, but involves inspection of samples of items produced and application of tests of significance.

* SAC is used to analyze the quality problems and solve them.

* SAC is the term used to describe the set of statistical tools used by quality professionals.

10. Mention any two practical situations where c-chart is needed.

For construction of c-chart, a record of the number of defects in each of the N articles inspected should be known. Since the probability of occurrence of a defect in a unit a is very small.