Frequently Asked Questions

1. Define acceptance sampling:

   Acceptance Sampling is a technique which deals with acceptance or rejection of a lot or process based upon the results obtained from a random sample or samples taken randomly from the lot.

2. Write the advantages and disadvantages of Acceptance sampling:

   Advantages of Acceptance Sampling

   1. Less expensive because of less inspection compare to entire lot.
   2. Less handling of product and hence reduce damage
   3. Applicable to destructive testing
   4. Fewer personnel are involved in inspection activities
   5. Reduces the amount of inspection error
   6. The rejection of lot motivate the vendor for quality improvement

   Disadvantages of Acceptance Sampling

   1. Risk of accepting a bad lots and rejecting a good lots
   2. Less information about the product
   3. Need some plan and formulation compare to 100% inspection

3. Write the need for acceptance sampling:

   Acceptance sampling is essential when:

   a. When the cost of the inspection is high and loss that arises from the passing out defective items is not too much
   b. When the inspection units are costly or destructive
   c. To maintain good quality: If the lots are rejected often the producer is forced to improve the production process. Hence acceptance sampling indirectly improves the quality of the products.
   d. To give protection to the consumer against the acceptance of bad lots. It also gives protection to the producer against the rejection of good lots. The consumer is given long run protection against the product. It minimizes the cost of inspection and administration. It provides a basis for action with regard to the production of units in future course.

4. Compare between 100% inspection and sampling inspection

100% inspection	Sampling inspection
1. 100% inspection is not efficient 2. it is subject to human errors arising out of fatigue and monotony. These errors cannot be quantified 3. It is not practicable for mass-production components 4. It is not feasible where destructive	1. Because of low quantities involved inspection will be efficient 2. It is subject to sampling errors which can be quantified and controlled 3. It is practicable for mass production components. 4. It is only alternative where destructive

testing is involved 5. It is costly, time consuming and effort some. 6. It does not develop an attitude of quality or pressure for quality	testing is involved 5. It is cheap ‘ quick and easy 6. It develops pressure for quality improvement by rejection of entire lots on the basis of findings in samples

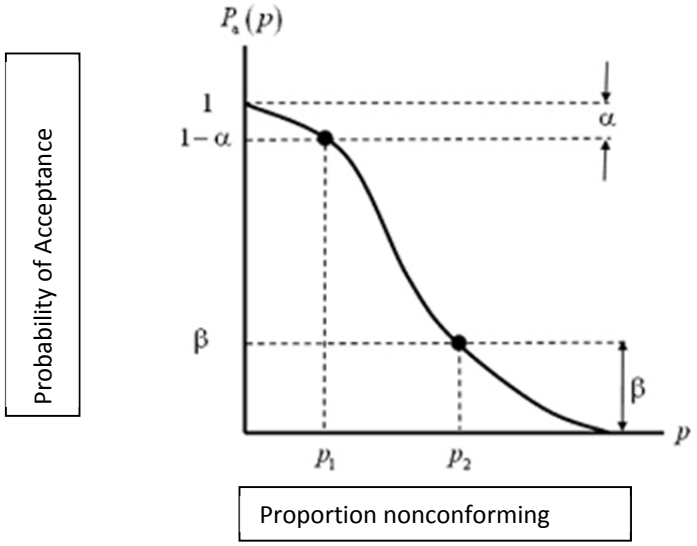
5. Define OC Fubnction

Operating Characteristic Function (OC Function): The operating characteristic function is the mathematical expression giving the probability of acceptance of a lot as a function of p, the fraction defective of the lot.

6. Define OC curve

Operating Characteristic Curve (OC Curve):

1. Given a sampling plan an Operating Characteristic Curve (OC) is a probability curve for a sampling plan that shows the probabilities of acceptance of lots with various lot quality levels (% defectives). It is a graph Showing probability of lot acceptance Pa as function of lot quality level (p) as given below



7. Distinguish between AQL and LTPD.

Acceptable Quality Level (AQL)

The fraction nonconforming units (proportion defective) at which a customer is willing to accept a lot with a stated high probability is called AQL. The probability of rejection at this quality level is very small which is denoted as α. A lot with this fraction nonconforming is considered as a good lot. The producer is expected to manufacture to ensure this acceptable quality. AQL is denoted by p_1.

Limiting Quality Level (LQL):

This is the maximum percent for purposes of sampling inspection that can be tolerated and above which the lot will be rejected. This is a bad quality level that

one may not wish to accept the lots with this quality more often than a small specified percent of the times. . The probability of acceptance at this quality level is very small which is denoted as β. It is denoted by P_2.

8. Explain the terms: AOQ and AOQL

Average Outgoing Quality (AOQ): In sampling inspection of lots, there is a likelihood of accepting lots inferior to a specified quality and rejecting lots superior to this quality. However in many situations lots rejected are screened and inspected cent percent. The accepted lots will have a fraction defective p that is equal to the incoming quality. The lots rejected, under rejection rectification scheme will have fraction defective equal to zero. In the long run the average value of these fraction defectives is called as the average outgoing quality. Thus the points whose coordinates are p and corresponding AOQ value lie on a unimodel curve starting from (0, 0) rising to a maximum at $p=p_m$ and terminating at (1, 0).

The proportion defective p_m corresponding to the maximum ordinate is the average outgoing quality limit (AOQL).

9. Explain the following: ASN and ATI,

Average Sample Number (ASN): The expected value of the sample size required for coming to a decision of accepting or rejecting a lot, under the sampling inspection plan, is called the average sample number. This is the average number of units inspected on sampling basis, which is applicable for double or multiple sampling plans only. In single sampling this is the same as the sample size.

Average Total Inspection (ATI): The average number of units inspected in total in a lot is called the average total inspection. This is based on the units inspected on sampling basis for accepted lots and inspected on 100% basis for rejected lots.

10. Define Consumers risk'

Consumer's Risk (β): By consumer we mean, a person, a department or a company that receives the items from a producer. In the case of sampling inspection a lot is declared acceptable or not on the basis of the quality of the sample. Sometimes even if the lot is bad the sampling results may lead to acceptance of the lot. There are chances of a bad lot getting accepted by the sampling inspection, in which case the consumer suffers a loss of rejecting a lot of good quality say p_2. The probability that a consumer accepts a lot of quality p_2 is called consumer's risk denoted by β.

i.e. β = P(accepting a bad lot) = P(accepting a lot of quality p_2)

11. Define Producer's risk

Producer's risk (α): By a producer we mean a person, a company or a firm that manufactures or sells articles to the consumer. Even if the lot is good the producer may have to face a risk of rejecting his product There are chances of a good lot getting rejected by the sampling inspection, in which case the producer suffers a loss of rejecting a lot of good quality say p_1. The probability of rejecting a lot of quality p_1 is called producer's risk, and is denoted by α.

i.e., α = P (rejecting a good lot) = P (rejecting a lot of quality p_1)

12. Define : Indifference Quality Level

Indifference Quality Level (IQL): The proportion defective (or the number of defectives per 100 units or the fraction nonconforming) at which the probability of acceptance is equal to probability of rejection [i.e., P (p) =0.5] is called indifference quality level (IQL). This is the quality level at which the consumer and the producer share equal risks of 0.5. IQL is denoted by p_0.This point on the OC Curve (p_0, 0.50) is called point of control.

13. What is ideal OC curve?

Ideal OC curve: Suppose a sampling plan is designed such that, p' is the desirable and stable nature of lot quality or product quality or process quality. A lot will be accepted whenever the sample proportion defective from the lot $p \leq p'$. Otherwise the lot will be rejected. That is, whenever $p > p'$ the lot will be rejected. The sampling plan which discriminates perfectly between good and bad lots is called ideal sampling plan. In this case, for all values of $p \leq p'$ the probability of Acceptance P_a will be equal to 1 and for all values of $p > p'$, Pa will be equal 0. Thus the curve of the ideal sampling plan will have Z shape

14. Write the characteristics of a good sampling plan:

Characteristics of a good sampling plan are:

1. It should be simple to understand and implement
2. It should minimize total inspection at process average quality
3. It should regulate/ minimize consumer's risk and producer's risk to acceptable values.
4. It should guarantee specified AOQL.
5. It should effectively assist in estimating lot quality if required.
6. It should be acceptable to both consumer and producer.