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COLLEGE OF ENGINEERING & TECHNOLOGY**

A-09, SECTOR-62, GAUTAM BUDHA NAGAR, NOIDA (U.P.)

DEPARTMENT OF CSE,ME,CE,ECE

**Subject- Industrial Management**

**Subject code –RAS-601**

**Question Bank No.4**

**TOPICS -UNIT 4**

**Q1. Each question contain 2 marks .For assignment attempt any Five.**

**(a) Give some detail of sequential sampling plan?**

Ans=Sequential sampling is different from single, double or multiple sampling. Here one takes a sequence of samples from a lot. How many total samples looked at is a function of the results of the sampling process.

The sequence can be one sample at a time, and then the sampling process is usually called item-by-item sequential sampling. One can also select sample sizes greater than one, in which case the process is referred to as group sequential sampling.

**(b) What is meant by statistical quality control?**

Ans=Statistical Quality Control (SQC) is the term used to describe the set of statistical tools used by quality professionals. Statistical quality control refers to the use of statistical methods in the monitoring and maintaining of the quality of products and services.

**(c) What is a control chart?**

Ans=The control chart is a graph used to study how a process changes over time. Data are plotted in time order. This versatile data collection and analysis tool can be used by a variety of industries and is considered one of the seven basic quality tools. Control charts for variable data are used in pairs.

**(d) What do you mean by sampling and sampling plan?**

Ans=Sampling is a process used in statistical analysis in which a predetermined number of observations are taken from a larger population. The methodology used to sample from a larger population depends on the type of analysis being performed, but it may include simple random sampling or systematic sampling.

A sampling plan is a term widely used in research studies that provide an outline on the basis of which research is conducted. It tells which category is to be surveyed, what should be the sample size and how the respondents should be chosen out of the population.

**(e) State the purpose and advantages of control chart.**

Ans=control charts are useful for:

1. Pinpointing errati or unpredictable processes;

2. Obtaining warning of impending trouble, such as an unexpected change in a process;
3. Evaluating product (service) consistency over time;
4. Decreasing performance variability in a process, thereby decreasing the level of post-process inspection of the output generated by the process;
5. Determining the cause of trouble when a process is generating output which has errors and mistakes; and
6. Knowing when a process is doing the best that can be expected from it.

**(f) Define Quality and Quality Control.**

Ans=Quality refers to how good something is compared to other similar things. In other words, its degree of excellence

Quality control (QC) is a process through which a business seeks to ensure that product quality is maintained or improved. Quality control requires the business to create an environment in which both management and employees strive for perfection.

**(g) What do you understand by Acceptance Sampling?**

Ans=Acceptance sampling is a statistical measure used in quality control. It allows a company to determine the quality of a batch of products by selecting a specified number for testing. The quality of this designated sample will be viewed as the quality level for the entire group of products.

A company cannot test every one of its products. There may simply be too high a volume or number of them to inspect at a reasonable cost or within a reasonable time frame. Or effective testing might result in the destruction of the product or making it unfit for sale in some way.

**Q2. Each question contain 5 marks .For assignment attempt any Five.**

**a) Give the common reasons for the failure of TQM programs.**

Ans=Some reasons for the failure of TQM Program are:-

**1: Improper Planning**

Organizations tend to be so anxious to begin doing "something", that they start off being unclear as to what they are trying to accomplish and how to get there. There is a time to jump to action and a time to insure that the actions are properly planned and considered. Jumping in too early creates chaos, and cynicism as expectations are frustrated.

**2: Management Confusion**

Managers need to lead the organization to quality processes. Too often managers have not considered what this means on a day to day level. Many managers will need some coaching on what their roles might be, and how to carry them out, but quite frequently, managers are not prepared for the tasks they face.

**3: Inadequate Support To Managers**

So far, there has been a tendency to hire TQM consultants to visit for a half-day or so to start

the process. This puts incredible pressure on managers since they have little ongoing access to the expert help they need to make this work. Also, some activities that are part of TQM are best carried out by "outsiders" who bring a different kind of objectivity to the process.

#### 4: Partial Implementation (Hedging)

Many organizations jump in by implementing only one piece of TQM, usually focussing on the customer, or collecting information from employees. Customer service is only one part of the puzzle, and empowering employees is not likely to bring about change unless other issues are addressed.

#### 5: Inadequate Marketing

There is considerable cynicism in the public sector these days. Employees have seen management fads come and go without impact. TQM programs that do not communicate the TQM principles, and management intent usually fail. TQM must be explained in ways which show how it will benefit all members of the organization. Then management must lead by example.

#### 6: Impatience

Any organization change requires perseverance and patience. Management that is not willing to work at it over an extended time will start backing off the principles and become inconsistent in their actions. That destroys their own credibility, and the credibility of organization change in general.

### **b) What is Process Control? What are the steps to improve Quality?**

Ans=Process Control is the active changing of the process based on the results of process monitoring. Once the process monitoring tools have detected an out-of-control situation, the person responsible for the process makes a change to bring the process back into control.

Steps to improve quality are:-

#### 1. Measure and Measure Some More

Two key performance indicators (KPIs) you should deploy today are quality escapes and quality captured. Determine which bucket quality mistakes fall into. The first bucket is comprised of mistakes that were internally "captured" by your team so the client was never aware of them. Captured quality errors aren't as bad because the client never knew -- maybe they suffered a delayed delivery, but that's it. Your client is not injured by the stumble.

#### 2. Focus on Process, Not People

Every employee comes to work to do a good job. In most cases, the defect is the process, not the person you trust. Remember that, and fix it by adding process steps or new checks to the system. Don't make it a game of "who screwed this up?" That will deflate the team. Everyone will cower in fear and point fingers without ever getting to the root cause.

#### 3. Meet Weekly

Initially the meetings will be long and tedious. You need to discuss with all the players each quality issue that occurred, and get to the root cause. Over time--less time than you think--the meetings will get shorter, as processes are strengthened and systems get more robust. Confidence will build as people see the systems are catching errors and eliminating heartburn.

#### 4. Create a Quality Chart

Sort the biggest quality issues by category and focus in on the big issues. Work them till they get to be small issues. Don't focus as much time on the unusual quality issues; spend your time in the places with the most frequent problems.

## 5. Make It Public

Place your quality results in your lunchroom. Everyone should see this is a company emphasis and you want to improve in a transparent way. The daily, visible reminder will demonstrate your commitment to quality to the people who impact it every day: your team.

### **c) What is inspection? Explain the different types of inspection.**

Ans=An item or component or product which is manufactured is required to perform certain functions. The act of checking whether a component actually does so or not is called Inspection. In other words, Inspection means checking the acceptability of the manufactured product.

Inspection measures the qualities of a product or service in terms of pre-decided standards. Product quality may be specified by its strength, hardness, shape, surface finish, chemical composition, dimensions, etc

Kinds of Inspection:

- (a) Roving, process, patrolling or floor inspection,
- (b) Fixed inspection,
- (c) Key-point inspection, and
- (d) Final inspection.

(a) Roving Inspection:

The inspector walks round on the shop floor from machine to machine and checks samples of the work of various machine operators or workers

Floor Inspection:

- (i) Helps catching errors during process itself, i.e., before the final production is ready; and
- (ii) It is more effective and desirable because the work need not be transported to a centralized (inspection) place.

(b) Fixed Inspection:

The work is brought at intervals for inspectors to check. Fixed inspection discovers defects after the job has been completed. Fixed inspection is used when inspection equipments and tools cannot be brought on the shop floor. It is a sort of centralized inspection, the worker and the inspector do not come in contact with each other; thus it eliminates any chances of passing a doubtful product.

(c) Key-Point Inspection:

Every product (more or less) has a key point in its process of manufacture. A key point is a stage beyond which either the product requires an expensive operation or it may not be capable of rework. Inspection at a key point segregates and thus avoids unnecessary further expenditure on poor and substandard parts, which are likely to be rejected finally.

(d) Final Inspection:

The final inspection of the product may check its appearance and performance. Many destructive and non-destructive inspection and test methods such as tensile, fatigue, impact testing, etc., and ultrasonic inspection, X-ray radiography, etc., respectively, are available for final inspection of the products manufactured. Final inspection is a centralized inspection and it makes use of special equipments.

Inspection of Finished Goods:

An unthorough inspection of finished and final goods may permit faulty products to be dispatched to the customers, because it is the last chance of detecting imperfections in the products manufactured.

**d) Discuss the objectives and advantages of Quality Control.**

the important objectives of quality control are :

1. To establish the desired quality standards which are acceptable to the customers?
2. To discover flaws or variations in the raw materials and the manufacturing processes in order to ensure smooth and uninterrupted production.
3. To evaluate the methods and processes of production and suggest further improvements in their functioning.
4. To study and determine the extent of quality deviation in a product during the manufacturing process.
5. To analyse in detail the causes responsible for such deviation.
6. To undertake such steps which are helpful in achieving the desired quality of the product.

Advantages of quality Control are:-

1. Encourages quality consciousness:

The most important advantage derived by introducing quality control is that it develops and encourages quality consciousness among the workers in the factory which is greatly helpful in achieving desired level of quality in the product.

2. Satisfaction of consumers:

Consumers are greatly benefited as they get better quality products on account of quality control. It gives them satisfaction.

3. Reduction in production cost:

By undertaking effective inspection and control over production processes and operations, production costs are considerably reduced. Quality control further checks the production of inferior products and wastages thereby bringing down the cost of production considerably.

4. Most effective utilisation of resources:

Quality control ensures maximum utilisation of available resources thereby minimising wastage and inefficiency of every kind.

5. Reduction in inspection costs:

Quality control brings about economies in inspection and considerably reduces cost of inspection.

6. Increased goodwill:

By producing better quality products and satisfying customer's needs, quality control raises the goodwill of the concern in the minds of people. A reputed concern can easily raise finances from the market.

**e) Explain the factors that affect Quality.**

Ans= These are the factor that affecting quality shown below:-

1. Market: Because of technology advancement, we could see many new products to satisfy customer wants. At the same time, the customer wants are also changing dynamically. So, it is the role of companies to identify needs and then meet it with existing technologies or by developing new technologies.

2. Money: The increased global competition necessitates huge outlays for new equipments and process. This should be rewarded by improved productivity. This is possible by minimizing quality costs associated with the maintenance and improvements of quality level.

3. Management: Because of the increased complex structure of business organization, the quality related responsibilities lie with persons at different levels in the organization.

4. Men: The rapid growth in technical knowledge leads to development of human resource with different specialization. This necessitates some groups like, system engineering group to integrate the idea of full specialization.

5. Motivation: If we fix the responsibility of achieving quality with each individual in the organization with proper motivation techniques, there will not be any problem in producing the designed quality products.

6. Materials: Selection of proper materials to meet the desired tolerance limit is also an important consideration. Quality attributes like, surface finish, strength, diameter etc., can be obtained by proper selection of material.

7. Machines and mechanization: In order to have quality products which will lead to higher productivity of any organization, we need to use advanced machines and mechanize various operations.

8. Modern information methods: The modern information methods help in storing and retrieving needed data for manufacturing, marketing and servicing.

9. Mounting product requirements: Product diversification to meet customers taste leads to intricacy in design, manufacturing and quality standards. Hence, companies should plan adequate system to tackle all these requirements.

**Q3. Each question contain 10 marks .For assignment attempt any Two.**

**a) What is double sampling plan? Describe the double sampling plan procedure.**

Ans=A sampling plan in which a decision about the acceptance or rejection of a lot is based on two samples that have been inspected is known as a double sampling plan.

The double sampling plan is used when a clear decision about acceptance or rejection of a lot

cannot be taken on the basis of a single sample. In double sampling plan, generally, the decision of acceptance or rejection of a lot is taken on the basis of two samples. If the first sample is bad, the lot may be rejected on the first sample and a second sample need not be drawn. If the first sample is good, the lot may be accepted on the first sample and a second sample is not needed. But if the first sample is neither good nor bad and there is a doubt about its results, we take a second sample and the decision of acceptance or rejection of a lot is taken on the basis of the evidence obtained from both the first and the second samples.

Suppose, lots of the same size, say  $N$ , are received from the supplier or the final assembly line and submitted for inspection one at a time. The procedure for implementing the double sampling plan to arrive at a decision about the lot is described in the following steps:

Step 1: We draw a random sample (first sample) of size  $n_1$  from the lot received from the supplier or the final assembly.

Step 2: We inspect each and every unit of the sample and classify it as defective or non-defective. At the end of the inspection, we count the number of defective units found in the sample. Suppose the number of defective units found in the first sample is  $d_1$ .

Step 3: We compare the number of defective units ( $d_1$ ) found in the first sample with the stated acceptance numbers  $c_1$  and  $c_2$ .

Step 4: We take the decision on the basis of the first sample as follows:

#### **b) Give the construction of X Control Charts in detail.**

Ans=1. Calculate average  $\bar{X}$  for each group

- i. A number of samples of items manufactured are collected at regular intervals (say 1 or 2 hours)
- ii. Their quality characteristics (diameter, thickness, weight, length etc. ) are measured.
- iii. For sample, mean value and the range is calculated. For example if sample size is of 5 items and dimensions are  $X_1, X_2, X_3, X_4$ , and  $X_5$

The Sample average  $\bar{X} = \frac{X_1 + X_2 + X_3 + X_4 + X_5}{5}$

2. Calculate Grand Average  $\bar{\bar{X}}$  and Average Range  $\bar{R}$ .

$\bar{X}$  is the average of  $\bar{X}$  value for each group.

$$\bar{\bar{X}} = \frac{\sum \bar{X}}{N}$$

Where  $\bar{X}$  = Average of Sample mean or average

And  $n$  = Number of observations, or subgroup

3. Calculate Control Charts for  $\bar{X}$  chart:

Upper Control Limit U C L for  $\bar{X} = \bar{\bar{X}} + A_2 \bar{R}$ ,

Lower Control Limit L C L for  $\bar{X} = \bar{\bar{X}} - A_2 \bar{R}$ .

The value of  $A_2, D_3, D_4$  are based on normal distribution and can be found out from standard

table for a particular sample size.

4. Plot X chart:

- i. Central line on the X chart should be solid horizontal line at  $\bar{X}$ .
- ii. The upper and lower control limits for X should be drawn as dotted horizontal lines at computed values.

Points outside the control limits are indicated with cross on the X chart, and the points outside the limits on R chart by a circle

**c) Give the construction of R Control Charts in detail.**

Ans=1. Calculate range R for each group

- i. A number of samples of items manufactured are collected at regular intervals (say 1 or 2 hours)
- ii. Their quality characteristics (diameter, thickness, weight, length etc. ) are measured.
- iii. For sample, the range is calculated.

The range will be  $R = \text{Highest value} - \text{Smallest value}$

2. Calculate Average Range  $\bar{R}$ .

Similarly, the average  $\bar{R}$ , is the sum of the ranges of the subgroup or observations divided by the number of sub group

$$\bar{R} = R/n$$

3. Calculate Control Limits for R Chart:

$$UCL \text{ for } R = D_4 \bar{R}$$

$$LCL \text{ for } R = D_3 \bar{R}$$

The value of  $A_2$ ,  $D_3$ ,  $D_4$  are based on normal distribution and can be found out from standard table for a particular sample size.

4. Plot R chart:

- i. Similarly for R chart central solid horizontal line will indicate  $\bar{R}$
- ii. The control limits are shown by dotted horizontal line at computed value
- iii. if the size of sample is 6 or less, the lower control limit for R is zero.



Points outside the control limits are indicated with cross on the X chart, and the points outside the limits on R chart by a circle

**d) Describe P and C Control chart in detail.**

In order to monitor proportions of a process, such as the proportion of defect products in a production line, we can use either p-charts or c-charts.

p-charts display the fraction of outcomes of a process which do not, or do obey some rules. The lower and upper control limits are again set in a way that the probability of a fraction falling outside these limits is quite low (i.e. <1 %). The lower control limit may often fall below zero, which does not make any sense in connection with fractions; in this case the lower control limit is set to zero.

(P- Chart) Fraction defective may be defined as the ratio of the number of defective articles in any inspection to the total number of articles actually inspected.

- i. Take adequate number of samples.
- ii. Find number of defective pieces found
- iii. Calculate fraction defective

$$P = d/n$$

- iv. Calculate  $P(1-P)$

$$UCL \text{ of } P = P + 3(P(1-P))/n$$

$$CL = P$$

$$LCL \text{ of } P = P - 3(P(1-P))/n$$

2.

A c-chart is quite similar to the p-chart, except that in this case the special outcomes (like defects) of a process are counted.

C- Chart (Number of Defects per Unit) In number of cases it is more convenient to work with number of defects per unit rather than fraction defective. For example number of defects in a bus body, air plane, TV set, etc. C- chart deals with the defects in the piece or unit of product manufactured.

- i. Samples are taken at regular intervals
- ii. It may be a length(wire), or an area( piece of cloth)
- iii. Number of defects are counted
- iv. Calculate C.

$$C = (\text{Total number of defects in all samples}) / \text{Total number of samples observed}$$

$$UCL \text{ of } C = C + 3C$$

$$C L = C$$

$$L C L \text{ of } C = C - 3 C$$

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