

SYED AMMAL ENGINEERING COLLEGE

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Course Name: TOTAL QUALITY MANAGEMENT

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UNIT I - INTRODUCTION

1. Define Quality.

Quality is defined as the degree to which a set of inherent characteristics fulfills requirements. Degree means that quality that can be used with adjectives such as poor, good and excellent. Inherent is defined as existing in something especially as a permanent characteristic. Characteristic can be quantitative or qualitative. Requirements is a need or expectation that is stated, generally implied by the organization, its customers, and other interested parties. Quality fulfills or exceeds our expectations.

It is quantified as $Q = P/E$ Q – Quality P – Performance E – Expectations. It is also defined as the degree of excellence a product or service provides. According to Deming “It is the predictable degree of uniformity, at low cost and suited to the market”.

According to Joseph Juran “Quality is fitness for use”. According to Philip B. Crosby “Quality is conformance to requirements”.

2. What are the dimensions of Quality?

The dimensions of Quality are: 1. Performance – Primary product characteristics such as the brightness of the picture. 2. Features – Secondary characteristics, added features, such as remote control. 3. Conformance – Meeting specifications or industry standards. 4. Reliability – Consistency of performance over time, average time for the unit to fail. 5. Durability – Useful life includes repair. 6. Service – Resolution of problems and complaints, ease of repair. 7. Response – Human to human interface, such as the courtesy of the dealer. 8. Aesthetics – Sensory characteristics such as exterior finish. 9. Reputation – Past performance and other intangibles, such as being ranked first.

3. Define Quality Planning.

It is defined as the process of planning to design and obtain a better quality product or service and to attain new break through goals.

4. What are the steps in Quality Planning?

According to Juran the steps included in Quality planning are: 1. Establish quality goals. 2. Identify customers. 3. Discover customer needs. 4. Develop product features. 5. Develop process features. 6. Establish process controls, transfer to operations.

5. Define Quality Cost.

Quality cost is defined as those costs associated with the non- achievement of product or service quality as defined by the requirements established by the organization and its contracts with customers and society. Simply stated quality cost is the cost of poor products or services. Quality cost is equated with the cost of attaining quality, it is also equated with the extra cost incurred due to poor quality.

6. What are the types of Quality Cost?

Various types of costs associated with Quality are

- ❖ Prevention cost
- ❖ Appraisal cost
- ❖ Internal Failure cost and
- ❖ External Failure cost

7. What is Trend analysis?

Trend analysis of quality cost shows the changes in cost over time period or change in cost that may occur in future. Time to time comparison of changes in quality cost over time period can be analyzed using trend analysis method.

8. Define Pareto Analysis?

Pareto chart was developed by an Italian economist namely Vilfrado pareto. The pareto chart is a specialized version of a histogram that rank the categories in the chart from most frequent to least frequent. This chart is used to display the pareto principle in action, arranging data so that a few vital factors are causing most of the quality problems. This chart is used to analyze the defects that

UNIT II - TQM PRINCIPLES

1. What is customer satisfaction?

Customer satisfaction is one of the major purposes of a quality management system. It is more of a feeling or attitude. Customer satisfaction is subjective and hard to measure. It is the degree to which the customer's experience of a service or product matches his or her expectations.

2. What are the factors influencing customer satisfaction?

The factors influencing customer satisfaction are: Performance Features Service Warranty
Price Reputation

3. What is meant by performance?

Performance involves fitness for use which is a phrase that indicates that a product and or service is ready for the use of customers at the time of sale. Other considerations are:

Availability- which is the probability that a product will operate when needed. Reliability, which is freedom from failure over time. Maintainability, which is the ease of keeping the product operational.

4. What is meant by features?

Features or attributes of a product or service are psychological , time oriented, contractual, ethical and technological. Features are secondary characteristics of a product or service. For example the primary function of an automobile is transportation, whereas a car stereo system is a feature of an automobile.

5. What is meant by service?

An emphasis on customer service is emerging as a method for organization to give the customer the added value. Customer service is an intangible- it is made up of many small things, all geared to changing the customer's perception .Intangible characteristics are those that are not quantifiable, yet contribute greatly to customer satisfaction. Providing excellent customer service is different from and more difficult than achieving product excellence.

6. What are the elements of customer service?

- ❖ Organization
- ❖ Customer care Communication
- ❖ Front line people
- ❖ Leadership

7. How is employee retention related to customer retention?

The employee retention has a significant impact on customer retention. The organization should continuously improve the methods of obtaining information relating to consumer needs and expectations. Continuous improvement and customer satisfaction always go hand in hand. Globally acclaimed competitors always tend to continually fine tune their operations to achieve additional improvements. Once maximization of customer satisfaction is successfully done, automatically the customer retention follows.

8. What is meant by motivation?

Motivation is the creation of the desire to do something. Knowledge of motivation helps to understand the utilization of employee involvement to achieve process improvement.

9. What is meant by employee empowerment?

Empowerment is an environment in which people have the ability, the confidence and the commitment to take the responsibility and ownership to improve the process and initiate the necessary steps to satisfy customer requirements within well-defined boundaries in order to achieve organizational values and goals.

10. Define team and team work.

Team is defined as a group of people working together to achieve a common objective or goals. Teamwork is the cumulative action of the team during which each member of the team subordinates his individual interest and opinions to fulfill the objectives or goals of the group.

11. What is the need for performance appraisal?

The purpose of performance appraisal is to let the employees know how they are doing & provide a basis for promotion & salary increase, counseling and other purposes relating the employee's future. Employees should be aware of the process of appraisal. The parameters of evaluation should be known to the employees. The appraisal should point out the employee's strength & weakness.

12. Narrate the steps to achieve employee satisfaction.

Know thyself Know your employees Establish a positive attitude Share the goals Monitor progress Develop interesting work like job rotation, job enlargement and job enrichment. Communicate effectively Celebrate the success.

13. What is meant by Quality circle?

QC are the group of people from one work unit who voluntarily meet together on a regular basis to identify, analyse and solve problems relating to quality and other problems in other areas. They choose their own problems, discuss among themselves and try to arrive at a viable solution for implementation. These quality circles are quite successful in Japan, though success of equal magnitude has not been able to be achieved in other countries.

14. What is Continuous process improvement?

Continuous process improvement is the heart of TQM Process. It consists of measuring key quality parameters and take active steps to improve them. TQM demands structured improvement programmes in all these areas of business administration, customer services, product quality and so on. The main aim of continuous process improvement is to improve the levels of customer satisfaction and reducing the cost of attaining this. The Organization should strive to achieve perfection and quality by continuously improving the production process and business.

15. What is Seire?

Seire is a Japanese word which means Organize. It is about separating the things which are necessary for the Job from those that are unnecessary and keeping the number of necessary things as low as possible and at a convenient location.

16. What is Seiton?

SEITON is a Japanese word which means to put things in order. Things must be kept in order so that they are ready for use when needed. An American Mechanical Engineer recalls that he used to spend so many hours for searching tools and parts, when he worked in U.S.A. Only after he joined in a Japanese company, he saw how easily workers were able to find what they needed and he realized the value of Seiton It is all about neatness. Neatness is a study of efficiency. It is a question of how quickly one can get the things needed and how quickly one can put them away. Things should be put back where they belong.

17. What is Seiso?

SEISO is a Japanese word, which means Clean up. Keep the workplace clean. Everyone in the organization from the managing director to the sweeper should undertake this Job.

18. What is Seiketsu?

SEIKETSU is a Japanese word which means Standardise. Seiketsu means continually and repeatedly maintaining neatness and cleanliness in the organization. It claims both personal cleanliness and the cleanliness of the environment. The emphasis is on visual management, transparency in storage (put appropriate labels) and standardization.

19. What is Shitsuke ?

Shitsuke is a Japanese word which means Discipline. Discipline means instilling the ability of doing things the way they are supposed to be done. Discipline is a process of repetition and practice. The emphasis in self-discipline is on creating a work force with good habits.

20. What is 5 – S Practice?

5-S (JAPANESE 5-S PRACTICE) is the key for Total Quality Environment. The 5-S Practice is a technique used to establish and maintain quality environment in an organization. The 5-S Stands for five Japanese words. 1.Seire (Organize) 2.Seiton (Put things in order) 3.Seiso (Clean up) 4.Seiketsu (Standardise) 5.Shitsuke (Discipline).

21. What is the logic behind 5-S Practice?

The logic behind the 5-S Practice is that organization, neatness, cleanliness, standardization and discipline at the work place are the basic requirements for producing high quality products and services, with high productivity and no wastage.

22. What do you mean by “KAIZEN”?

Kaizen is a Japanese word, which means small but continuous improvement. It means ongoing improvement involving everyone including managers and workers. The Kaizen philosophy assumes that our way of life i.e. our professional life, social life or personal life – deserves to be constantly improved. In the Kaizen philosophy , improvement in all areas of business such as cost, meeting delivery schedules, employee safety and skill development, supplier relations, new product development or productivity all enhances the quality of the firm. Thus, any activity directed towards improvements falls under Kaizen Umbrella. Activities such as establishing traditional quality control systems , installing robotics and advanced technology, instituting employee suggestion systems, maintaining equipment and implementing JIT Production systems all leads to improvement (or) all can be reduced to one word namely KAIZEN.

23. Explain the term “JIT”?

“JIT” is a Japanese technique, which means Just-in-time technique. The primary goal of JIT is to achieve Zero inventory in an organization as well as throughout the entire supply chain. “Just-in-time” is not a jargon term for a new concept. It represents a goal. That goal is the ultimate total elimination of inventory.

24. What are the key elements for partnering Relationship?

The three key elements for partnering relationship are

1. Long term commitment
2. Trust
3. Shared Vision

UNIT III - TQM TOOLS AND TECHNIQUES I

1. What are the seven quality tools?

Cause-and-effect diagram ; Check sheet ; Control chart ; Histogram ; Pareto chart ; Scatter diagram; Stratification

2. Define Pareto Diagram?

It is a process tool to classify data and rank categories in descending order of occurrence to separate significant categories from trivial ones. Separating data into category, counting occurrences in each category, and arranging categories from highest to lowest frequency and drawing and labeling bars for each category does it.

3. Define the Ishikawa diagram?

It is called as Fishbone diagram which a process tool to identify possible causes for a particular effect.

4. Explain Histogram?

It is meaningful to present data in a form that visually illustrates the frequency of occurrence of values.

5. Define Scatter Diagram?

The scatter plot is a useful way to discover the relationship between two factors, X and Y, i.e., the correlation. An important feature of the scatter plot is its visualization of the correlation pattern, through which the relationship can be determined

6. What are Measures of Central Tendency? What are Measures of Dispersion?

Measures of central tendency are measures of the location of the middle or the center of a distribution. The definition of "middle" or "center" is purposely left somewhat vague so that the term "central tendency" can refer to a wide variety of measures. The mean is the most commonly used measure of central tendency.

7. Define Process Capability?

In any manufacturing process, the variability is inherent and cannot be eliminated fully though it can be controlled to some extent. The extent of variability decides Go, Non-Go or Acceptance, Rejection of the products. Statistics renders an immense help to assess this variability quantitatively and to take the correction action promptly before any disaster that may occur as a consequence. Process capability study is a statistical tool or technique, to assess the variation in the ability of the process during the conversion of feed material.

8. What is meant by predictive maintenance and preventive maintenance?

Predictive maintenance is the process of using data and statistical tool to determine when a piece of equipment will fail. Predictive maintenance is the process of periodically performing activities such as lubrication on the equipment to keep it running.

9. Define Mean, Median, and Mode with example?

The arithmetic mean is what is commonly called the average: When the word "mean" is used without a modifier, it can be assumed that it refers to the arithmetic mean. The mean is the sum of all the scores divided by the number of scores. The formula in summation notation is: $\mu = \Sigma X/N$ where μ is the population mean and N is the number of scores. Median: When there is an odd number of numbers, the median is simply the middle number. For example, the median of 2, 4, and 7 is 4. When there is an even number of numbers, the median is the mean of the two middle numbers. Thus, the median of the numbers 2, 4, 7, 12 is $(4+7)/2 = 5.5$

10. Define Population and Sample with example?

A sample is a subset of a population. Since it is usually impractical to test every member of a population, a sample from the population is typically the best approach available. A population consists of an entire set of objects, observations, or scores that have something in common. For example, a population might be defined as all males between the ages of 15 and 18.

9. What is Themes of Six sigma?

Themes of six sigma are as follows:

- Genuine focus on the customer
- Data and fact driven management
- Process is where the action is
- Proactive management
- Boundary less collaboration

10. What are the types of histograms?

There are five types of histograms depending on the type of distribution .They are : 1.Bell shaped distribution 2.Double peaked distribution 3.Plateau distribution 4.Comb distribution 5.Skewed distribution

UNIT IV - TQM TOOLS AND TECHNIQUES II

1. What is meant by benchmarking?

The process of gathering information about the 'best quality product manufacturing company' in order to copy, follow and excel, is known as benchmarking. Benchmarking is defined as a systematic method (or) popular TQM tool by which organizations can measure themselves against the best industry practices.

2. What are the six steps in benchmarking process?

1. Deciding what to benchmark
2. Understanding current performance
3. Planning
4. Studying others
5. Learning from the data
6. Using the findings and taking action

3. What is meant by quality function deployment (QFD)?

Quality function deployment (QFD) is a TQM tool which ensures that customer's requirements are met throughout the design process and also in the production systems.

4. Write about House of quality.

The primary planning tool in QFD is the House of Quality. House of Quality is a set of matrix used to translate the voice of the customers into technical design requirement that meet specific target values and characteristics of the final product. Because of its structure, it is referred to as the 'House of Quality'.

5. What are the six steps to build 'House of Quality'?

1. Identify voice of the customers
2. Identify technical descriptors.
3. Relate the voice of the customers to the technical descriptors
4. Conduct an evaluation of competing products
5. Evaluate technical descriptors and develop targets.
6. Determine which technical descriptors to deploy in the remainder of the production process

6. What are the Taguchi's Quality Loss Functions?

Taguchi has defined quality as the loss imparted to society from the time a product is shipped.

There are three common quality loss functions.

1. Nominal - the - best
2. Smaller – the – better
3. Larger – the – better

7. Define Total Productive Maintenance (TPM).

Total Productive Maintenance is defined as keeping the running plant and equipment at its highest productive level with the cooperation of all areas of organization.

8. What is meant by predictive maintenance and preventive maintenance?

Predictive maintenance is the process of using data and statistical tool to determine when a piece of equipment will fail. Preventive maintenance is the process of periodically performing activities such as lubrication on the equipment to keep it running.

9. Name different loss measurements in TPM?

- a. Down time losses – Planned – Unplanned
- b. Reduced Speed Losses
- c. Poor Quality Losses

10. Name is meant by Availability?

Down time losses are measured by equipment availability (A) using the equation, Availability $A = (T/P) * 100$ Where T= Operation time (P-D) P=Planned operation time D= Down time

11. What is meant by Failure Mode and Effect Analysis (FMEA) ?

Failure Mode and Effect Analysis (FMEA) is an analytical technique which combines the technology and experience of the people To identify foreseeable failure modes of a product(or) process To plan for its elimination.

12. Define Reliability.

Reliability is defined as the probability of a product performing satisfactorily without failure of a specified function under specified conditions for a specified period of time.

13. What are the three main categories of failure?

1. Debug
2. Chance
3. Wear out

11. What is Debug failure?

Debug includes a high failure rate at the initial stages because of inappropriate use (or) flaws in the design (or) manufacturing.

15. What are the two important types of FMEA?

1. Design FMEA
2. Process FMEA

16. Write some effects of failure.

1. Noise
2. Vibration
3. Erratic operation
4. poor performance
5. Lack of stability.

17. What is meant by performance efficiency?

Reduced speed losses are measured by tracking performance efficiency using the equation, Performance efficiency $E = (C \cdot N / T) \cdot 100$ Where C=Cycle time N= Number of units produced.

UNIT V - QUALITY SYSTEMS

1. Why do we need a Quality system?

In order to assure the quality of a product, the manufacturer must ensure its quality. So, to ensure this quality it is necessary to make a systematic study and control check at every stage of production. It is also essential to take critical review of efforts and achievements of the company with respect to the quality of the product. Thus it is necessary to develop a standard quality system.

2. What do you mean by ISO 9000 quality standard?

The ISO 9000 system is a quality management system that can be adopted by all types of organizations belonging to government, public, private, (or) joint sectors. The ISO 9000 system shows the way in creating products by preventing deficiencies, instead of conducting expensive post product inspections and rework.

3. What is two party quality systems?

In two party quality systems, the supplier of the product (or) service would develop a quality system that would conform to his standard. The customer would then audit this system for acceptability. Here the supplier and customer form the two parties.

4. What is a third party registration system?

In two party registration systems – after auditing, it may be found that the customer's quality requirements are not met. In order to avoid this and also the cost incurred in multiple audits, a standard quality system must be developed and audited by a third party registration system.

5. Name some third party registration system?

The ISO 9000, QS 9000, ISO 14000 and other quality systems are such third party registration systems that indicate to customers (or) potential customers that the suppliers has a quality system in place and it is being monitored.

6. Define quality auditing?

The International Organization for Standardization (ISO) defines an audit as a “systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and suitable to achieve objects”.

7. What is the two type's quality audit?

Quality audit can be classified into two types – internal and external audit.

8. What do you mean by external and internal audit?

An internal audit is conducted by personnel within the organization. An external audit is conducted by people from the organization such as the purchasing party (second – party audit) (or) a certified auditing agency (third – party audit).

9. How can “Quality audit” be classified on the basis of the area taken into account for the audit?

1. System Audit
2. Process Audit
3. Product Audit
4. Adequacy Audit
5. Compliance Audit

10. What is the use of QS 9000?

The QS 9000 standard defines the fundamental quality expectations from the suppliers of production and service parts. The QS 9000 standard uses ISO 9000 as its base with much broader requirements.

11. What is the use of ISO 14000 standard?

ISO 14000 standard gives the company a background on which to base its Environmental Management System (EMS). This system can be joined with other quality standards and can be implemented together to achieve the organizations environmental targets. The overall aim of the system is to provide protection to environment and to prevent pollution.

12. What are the equivalents of various standards in Indian Standards System?

The equivalents of the above standards in Indian Standards System , developed by the Bureau of Indian Standards are as below: 1.ISO :9000 -IS :14000 –1988 2.ISO :9001 - IS :14001 – 1988 3.ISO :9002 - IS : 14002 – 1988 4.ISO :9003 - IS :14004 – 1989

13. What are the other quality systems?

The other quality systems are AS 9100 used in aerospace industry, ISO/TS 16949, which is called as Quality Systems Automotive Suppliers – Particular Requirements for the application of ISO 9001, TS 9000 a consolidation of the various quality system requirements within telecommunications industry , QS 9000 and ISO 14000. Out of these Qs 9000 uses ISO 9000 as its foundation.But its requirements are much broader.

14. What is a quality manual?

A quality manual is to be established and maintained. It should include: 1.The scope of the QMS with details and justification for any exclusions. 2. The documented procedure or references to them. 3. A description of the interaction among the QMS processes

15. What are the steps involved in implementing Quality system?

Systematic implementation of quality system involves the following essential steps:

1. Initiating total quality management.
2. Planning to achieve objective in a coordinated manner.
3. Orientation of staff.
4. Implementation
5. Monitoring.
6. Consolidation