**DHANALAKSHMI SRINIVASAN COLLEGE OF ENGINEERING AND TECHNOLOGY**

**Mamallapuram, Chennai-603104.**

 **DEPARTMENT OF MECHANICAL ENGINEERING**

**QUESTION BANK**

**Subject Code & Name:** ***GE8077- TOTAL QUALITY MANAGEMENT***

# UNIT-I – INTRODUCTION

# PART-A

1. **Define TQM.**

TQM is the management approach of an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society.

Total Made up of the whole

Quality Degree of excellence a product or service provides Management Act, art, or manner of handling, controlling, directing, etc.

TQM is an enhancement to the traditional way of doing business. It is the art of managing the whole to achieve excellence. It is defined both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. It is the application of quantitative methods and human resources to improve all the processes within an organization and exceed customer needs now and in the future. It integrates fundamental managementtechniques, existing improvement efforts, and technical tools under a disciplined approach.

# Define Quality. Or How can quality be quantified? (NOV/DEC 2011, MAY/JUNE 2014,MAY/JUNE 2015, MAY/JUNE 2016)

Quality is a predictable degree of uniformity and dependability, at low cost and suited to the market (Deming), Quality is fitness for use (Juran), Quality is conformance to requirements (Crosby), Quality = Performance / Expectations.

# Define the different views of Quality and evolution of quality.

**From the user’s point of view**: Quality is an expression of the products/ services usefulness in meeting the needs and expectations and its reliability, safety, durability and so on.

**From the production point of view:** Quality of a product is measured by the quality of its performance which depends on the quality of design and the quality of conformance.

Evolution of quality provides high degree of assurance that manufacturer will consistentlyproduce medical devices that are safe

1. Perform as intended
2. Comply with customer requirements
3. Comply with regulatory requirements
4. Have the appropriate degree of quality

# What are the Dimensions of Quality? ( NOV/DEC 2013, 2017)

Dimensions of product (or manufacturing) quality: 1) Features 2) Performance 3) Conformance 4) Reliability 5) Durability 6) Service 7) Response 8) Aesthetics 9) Reputation

# Dimensions of service quality:

* 1. Reliability 2) Responsiveness 3) Assurance 4) Empathy 5) Tangibles 6) Other dimensions.

# List the characteristics of TQM.

1. TQM is a customer oriented
2. TQM required a long term commitment for continuous improvement of all processes.
3. TQM is teamwork.
4. TQM requires the leadership of top management and continuous involvement
5. TQM is a strategy for continuous improving performance at all levels and in all areas ofresponsibility.

# Give the Basic Concepts of TQM? ( NOV/DEC 2012, NOV/DEC 2013)

1. Top management commitment
2. Focus on the customer
3. Effective involvement and utilization of the entire work force.
4. Continuous improvement
5. Treating suppliers as partners.
6. Establish performance measures for the processes.

# List the elements of TQM. ( MAY/JUNE 2013, NOV/DEC 2014)

The philosophy elements, The generic elements, Tools of the QC department

# What are the four pillars of TQM?

Problem solving discipline, Interpersonal skills, Teamwork, Quality improvement process.

# Give the Principles of TQM?

1. Customer’s requirements must be met the first time, every time.
2. There must be agreed requirements, for both internal and external customers.
3. Everybody must be involved, from all levels and across all functions
4. Top management participation and commitment is must.
5. Every job must add value
6. There must be a focus on the prevention of problems
7. There should be focus on team work.

# Give the Obstacles associated with TQM Implementation? (MAY/JUNE 2015, June/July 2021).

Lack of management commitment, Inability to change organizational culture, Improper planning, Lack of continuous training and education, Incompatible organizational structure and isolated individuals and departments, Ineffective measurement techniques and lack of access to data and results, Paying inadequate attention to internal and external customers, Inadequate use of empowerment and teamwork.

# What are the benefits of TQM? (NOV/DEC 2011) Tangible Benefits:

1. Improved product quality
2. Improved Productivity
3. Reduced quality costs
4. Increased market and customers
5. Increased profitability
6. Reduced employee grievances

# Intangible Benefits:

1. Improved employee participation
2. Improved teamwork
3. Improved working relationships
4. Improved customer satisfaction
5. Improved communication
6. Enhancement of job interest
7. Enhanced problem solving capacity
8. Better company image

# List the quality gurus in TQM.

Walter A. Shewhart, W. Edwards Deming, Phillip Crosby, Joseph M. Juran

# Write the fundamental factors which affects quality.

Fundamental factors affecting Quality: (9 M‘s)

1. Market, 2. Money, 3. Management, 4. Men, 5. Motivation, 6. Materials, 7. Modern Information Methods, 8. Mounting Product Requirements.

# What are four absolutes of quality observed by Crosby? (DEC 2012 ,May 2017) FOUR ABSOLUTES OF QUALITY:

* + First Absolute:The definition of quality is conformance to requirements, not goodness.
	+ Second Absolute: The system for causing quality is preventive, not appraisal.
	+ Third Absolute: The performance standard must be zero defect, not “that’s close enough”
	+ Fourth Absolute: The measurement of quality is the price of non- conformance,not indexes

# Define service quality. (MAY/JUNE 2013, MAY/JUNE 2016)

Quality of service is judged by the customers on many dimensions in addition to the physicaland functional characteristics associated with the service.

The Various aspects or dimensions of service which are found to be very important in determining customer perception of service quality include:

1. Reliability
2. Responsiveness
3. Assurance
4. Empathy
5. Tangibles
6. Other dimensions

# List the elements of Quality statements.(Dec 2017)

Three elements of quality statements are:

1) Vision Statement, 2) Mission Statement, 3) Quality Policy Statement.

# What is a mission statement and list the key elements of mission statement?

The mission statement answers the following questions: who we are, who are the customers, what we do, and how we do it.

The mission statement, is usually one paragraph, describes the function of the organization. It provides a clear statement of purpose from employees, customers and suppliers. The statement includes following attributes.

1. Obligation to stakeholders
2. Scope of the business
3. Sources of competitive advantage
4. View of the future

# What is a vision statement?

The vision statement is a short declaration of what an organization should look like fiveto ten years in a future.

# Characteristics of Vision statement:

1. Is easily understood by all stakeholders
2. Is briefly states, yet clear and comprehensive in meaning
3. Is challenging, yet attainable
4. Is capable of stirring excitement for all stakeholders
5. Is capable of creating unity of purpose among all stakeholders
6. Is not concerned with numbers
7. Sets the tone for employees.

# What is a quality policy statement? (May 2017, Dec 2017)

The Quality Policy is a guide for everyone in the organization as to how they should provide products and service to the customers. The common characteristics are

* Quality is first among equals.
* Meet the needs of the internal and external customers.
* Equal or exceed the competition.
* Continually improve the quality.
* Include business and production practices.
* Utilize the entire work force.

# What are the various types of customer?

1. Internal Customers: The customers inside the company are called internal customers.
2. External customers: The customers outside the company are called external customers.Types of external customers: Purchaser, End user/ ultimate customer, Merchants, processors, Suppliers, Potential customer, Hidden customers.

# What are the important factors that influenced purchases? (or) What are the customerperceptions of quality?

1) Performance 2) Features 3) Service 4) Warranty 5) price 6) Reputation.

# List the tools used for feedback.

Comment cards, Customer questionnaire (online, phone and mail surveys), Focus groups , Toll-free telephone lines, Customer visits, Report cards, Post transaction surveys, Employee feedback, Social media.

# What are the activities to be done using customer complaints?

* Investigate customer’s experience both positive and negative, and then acting on it promptly.
* Develop procedures for complaint resolution. Analyze complaints.
* Work to identify process and material variations and then eliminate the root cause.
* When a survey response is received, a senior manager should contact the customer and strive to resolve the concern.
* Establish customer satisfaction measures and constantly monitor them.
* Communicate complaint information, as well as the results of all investigations and solutions, to all people in the organization.

# Define Customer complaint, Customer Retention and Customer care. (NOV/DEC 2014, June/July 2021).

A **customer complaint** may be defined as an expression of dissatisfaction with a product/ service, either orally or in writing, from an internal or external customer.

**Customer retention** is the process of retaining the existing customers. It is obvious that

**customer retention** is more powerful and effective than customer satisfaction.

Customer care can be defined as every activity which occurs within the organization that ensures that a customer is not only satisfied but also retained.

# Write down the categories of quality cost. (NOV/DEC 2016)

The cost of quality **(COQ)** can be classified into the following **four** categories.

* 1) Cost of prevention, 2) Cost of appraisal, 3) Cost of Internal Failures and 4) Cost of External Failures.

# What are the different ways to create customer oriented culture in an industry? (NOV/DEC 2016).

* Organizational Alignment
* Top team Clarity
* Listen to employees
* Listen to customers- both internal and external
* Customer Journey Mapping
* Building trust
* Maximize the value of customer feedback
* Frequency of feedback
* Acting on survey findings
* Embedding customer orientated behaviours.

# Elucidate Kaizen. (NOV/DEC 2018).

The objective of **Kaizen** is to improve productivity, reduce waste, eliminate unnecessary hard work and humanize the workplace. ... With **Kaizen**, workers at all levels of the organization are engaged in constantly watching for and identifying opportunities for change and improvement.

# What do you mean by cost of quality? (NOV/DEC 2018).

Cost of quality (COQ) is defined as a methodology that allows an organization to determine the extent to which its resources are used for activities that prevent poor quality, that appraise the quality of the organization's products or services, and that result from internal and external failures.

# Differentiate quality of performance and quality of conformance. (APR/MAY 2018)

**Quality of performance** is how well the product functions or service performs when put to use. It measures the degree to which the product or Service satisfies the customer from the perspective of both **quality** of design and the **quality of conformance**.

# Name any four methods of receiving customer complaints. (APR/MAY 2018)

1. Feedback form given manually.
2. Online feedback form
3. Gadget placed at billing point.
4. Telephonic toll free number method.

# PART – B

1. Elaborate the Deming’s philosophy over the quality and productivity improvement. (OR)
2. Explain the fourteen steps of Deming’s Philosophy for improving quality, productivity and competitiveness. **(NOV/DEC 2011, DEC 2012, DEC 2013, DEC 2014,MAY 2015, DEC 2017, June/July 2021).**
3. Define quality. Explain the evolution of quality. **(NOV/DEC 2013,MAY/JUNE 2016).**
4. Consider any one service organization of your choice and explain the various dimensions of quality of service.

(OR)

1. Explain the six basic concepts of TQM. Also, Discuss about the nine dimensions of quality.

# (May 2017, NOV/DEC 2011,NOV/DEC 2012, MAY/JUNE 2013,MAY/JUNE 2014,NOV/DEC 2016, June/July 2021).

1. Discuss in detail about the Basic concepts & Elements of TQM. **(NOV/DEC 2011,MAY/JUNE 2015).**
2. Discuss Juran’s principle of Quality improvement. **( MAY/JUNE 2014, MAY/JUNE**

# 2013, MAY/JUNE 2016, APR/MAY 2018)

1. Discuss the contribution of Crosby. (Or) Elaborate the fourteen steps involved in crosbys total quality approach? **(May 2017)**
2. Describe the barriers in the implementation of TQM. **(NOV/DEC 2011, NOV/DEC 2012,NOV/DEC 2013,MAY/JUNE 2014,NOV/DEC 2014,MAY/JUNE 2016).**
3. Explain the principles and characteristics of TQM? **( MAY/JUNE 2013, NOV/DEC 2016)**
4. Discuss in detail about the basic concepts of quality.
5. Discuss about the three quality statements, give an example for each. **(DEC 2014)**
6. Explain the issues related to customer complaints. **(MAY/JUNE 2015)** (or) Explain the common customer feedback collection tools?**(MAY 2017)**
7. Explain about the customer retention, Customer complaints:
8. Write short note on customer satisfaction. (Or) What are the customer perception of quality? **(Dec 2017)**
9. What is quality cost? Explain the techniques used for of quality cost. **(Dec 2017).**
10. Explain the role of senior level management in TQM implementation. **(NOV/DEC2016).**
11. Illustrate the various steps involved in customer satisfaction process. **(NOV/DEC2016).**
12. Discuss the need and basic concepts of TQM. **(NOV/DEC 2018).**
13. Explain in detail about Deming Philosophy. **(NOV/DEC 2018).**
14. What is quality cost? Explain the different categories and elements of COQ. Howit is useful as a performance measure? **(APR/MAY 2018)**
15. Discuss the implementation of TQM with a case study in a manufacturing sector.

# (June/July 2021).

**UNIT-II TQM PRINCIPLES**

**PART A**

# 1. Define Leadership.

Leadership is lifting of man’s visions to higher sights, the raising of man’s performance to a higher standard, the building of man’s personality beyond its normal limitations. Leadership is the process of influencing others towards the accomplishment of goals.

# Define the characteristics of a leader. (NOV/DEC 2011,MAY/JUNE 2013)

The customers first, Value People, Build supplier partnership, Empower People, Demonstrate involvement/ Commitment, Strive for excellence, Explain and deploy policy, Improve communication, Promote teamwork, Benchmark Continuously, Encourage collaboration.

# List the various styles of effective leaders.

Directing Style of leadership, Consulative style of leadership, Participative style of

leadership, Delegating style of leadership.

# List the requirements of effective leadership

Vision, Empowerment, Intuition, self-understanding, Value congruence.

# What are the roles of a leader?

Producer role, Director role, Coordinator role, Checker role, Stimulator role, Mentor role, Innovator role, Negotiator role.

# What is the important role of senior management?

* To study and investigate the TQM concepts and issues.
* To set clear quality policies and provide challenging tasks
* To bring a cultural charge required for the TQM effort.
* To uphold norms and values, and let it be known.
* To attend TQM training programmes.

# List the leading practices for leadership.

* + - Leaders focus on creating and balancing value for customers and other stakeholders that serves as a basis for setting business directions and performanceexpectations at all levels of the organization.
		- Leaders create and sustain a leadership system and environment for empowerment, innovation, agility and organisational learning.
		- Leaders set high expectations and demonstrate substantial personal commitmentand involvement in quality.
		- Leaders integrate public responsibilities and community support into their business practices.

# What is quality council?

* A quality council is a team to provide overall direction for achieving the total quality culture.
* A quality council is a team formed in the organization with an objective of building quality into the culture of the organization.
* Quality council helps to build quality into the culture and provide overall direction.

# List the responsibilities of the Quality council coordinator.

* To develop two way trust
* To propose team requirements to the council
* To share council expectations with the team
* To empower the team
* To brief the council on team progress.

# List the members of Qulaity Council.

Three members of quality council are:

* Chief executive officer (CEO)
* The senior managers of the functional areas, such as design, marketing, finance, production and quality. A quality council coordinator or consultant.

# Define reward.

Reward is something tangible to promote desirable behavior. Recognition and reward go together to form a system for letting people know they are valuable members of the organization.

# Define teamwork.

Teamwork is the cumulative actions of the team during which each member of the team subordinates his individual interests and opinions to fulfill the objectives or goals of the group.

# What are the key elements included in safety needs specified by Maslow?

* Protection from physiological dangers
* Economic security
* Desire of an orderly and predictable environment and
* Desire to know the limits of acceptable behavior.

# What is strategic planning?

Strategic planning sets the long term direction of the organization in which it wants to proceed in future.

Strategic planning can be defined as the process of deciding on objectives of the organization, on changes on these objectives, on the resources used to attain these objectives and on the policies that are to govern the acquisition, use and disposition of these resources.

# Give the basic steps to strategic quality planning?

* Identification of Customer needs
* Determination of Customer positioning
* Predict the future
* Gap analysis
* Closing the gap
* Alignment
* Implementation

# Difference between Strategic Quality planning and Traditional strategic planning.

|  |  |
| --- | --- |
| **Traditional strategic planning** | **Strategic Quality planning** |

|  |  |
| --- | --- |
| Focus is not defined or is spread among many considerations | Focus is on customers. |
| Leaders lack understanding of factorscritical to success | Leaders determine critical success factors |
| Goals and Objectives are results oriented | Goals and Objectives are process andresults oriented |
| Focus is on products | Focus is on processes |
| Improvement activities lack focus. | Improvement activities are focused on activities critical to success |

* 1. **Define Employee Involvement?**

Employee involvement is a means to better meet the organization’s goals for quality andproductivity at all levels of an organization.

# Define Motivation.

Motivation means a process of stimulating people to accomplish desired goals. Motivation is the process of attempting to influence others to do your will through thepossibility of reward.

Motivation is the process of inducing people inner drives and action towards certain goalsand committing their energies to achieve these goals.

# State Maslow’s Hierarchy of Needs.

Physiological needs, Safety, Social, Esteem, Self-actualization

# State Frederick Herzberg’s Two-factor theory?

Herzberg found that people were motivated by recognition, responsibility,achievement and the work itself.

# What does an employee want?

Interesting work, Appreciation, Involvement, Job security, Good pay, Promotion/growth, Good working conditions, Loyalty to employees, Help with personal problems, Tactful discipline.

# What are the concepts to achieve a motivated work force?

* Know thyself
* Know your employees
* Establish a positive attitude
* Share the goals
* Monitor progress
* Develop interesting work
* Communicate effectively
* Celebrate success

# Define Empowerment?

Empowerment means invest people with authority. Its purpose is to tap the enormous reservoir of creativity and potential contribution that lies within every workerat all levels.

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 to initiate the necessary steps to satisfy customer requirements within well-defined boundaries in order to achieve organizational values an goals.

# What are the three conditions necessary to create the empowered environment?

* Everyone must understand the need for change.
* The system needs to change for the new paradigm
* The organization must enable its employees.

# What are the principles for empowering employees?

* Tell people what their responsibilities are
* Give them authority equal to the responsibility assigned to them
* Set standard of excellence
* Provide them with training that will enable them to maintain standards
* Give them knowledge and information
* Provide them with feedback on their performance
* Treat them with dignity and respect.

# What are the characteristics of empowered employees?

* They feel responsible for their own task.
* They are given a free hand in their work
* They balance their own goals with those of the organization.
* They are well trained, equipped, creative and customer oriented
* They are challenged and encouraged

# Define team.

A team can be defined as a group of people working together to achieve common objectives or goals.

# What are the benefits of teamwork? (MAY 2015) (or) Why team and team work are required in tqm?(May 2017)

* Improved solutions to quality problems
* Improved ownership of solutions
* Improved communications
* Improved integration

# What are the types of teams?

* Process improvement team
* Cross-functional team
* Natural work teams
* Self-directed/self-managed work teams

# What are the characteristics of successful teams?

* Sponsor

procedures

* Team charter
* Team composition
* Training
* Ground rules
* Clear objectives
* Accountability
* Well-defined decision
* Resources
* Trust
* Effective problem solving
* Open communications
* Appropriate leadership
* Balanced participation
* Cohesiveness

# What are the elements of effective teamwork?

Purpose, Role and responsibilities, Activities, Effectiveness, Decisions, Results, Recognition

# What are the activities of team management wheel?

* Advising
* Innovating
* Promoting
* Developing
* Organizing
* Producing
* Inspecting
* Maintaining
* Linking

# What are the stages of team development?

* Forming
* Storming
* Norming
* Performing
* Maintenance
* Evaluating

# Give some common team problems?

* + Floundering
	+ Overbearing participants
	+ Dominating participants
	+ Reluctant participants
	+ Unquestioned acceptance of opinions as facts

#  What are the common barriers to team progress? ( NOV/DEC 2011)

* + Insufficient training
	+ Incompatible rewards and compensation
	+ First-line supervisor resistance
	+ Lack of planning
	+ Lack of management support
	+ Access to information systems
	+ Lack of union support

#  Give the role of team members.

* + Devote themselves to the common team goals based on a common mission andvision
	+ Feel themselves responsible and equal
	+ Be interested and motivated
	+ Accept, appreciate and respect each other
	+ Give high priority to continuous improvement
	+ Participate actively with the activities of the team
	+ Offer views, opinions and ideas freely and voluntarily.
	+ Rush to accomplish
	+ Attribution
	+ Discounts and “plops”
	+ Wanderlust : digression and tangents
	+ Feuding team members

# Define Recognition.

Recognition is a form of employee motivation in which the organization publicly acknowledges the positive contributions an individual or team has made to the success of the organization.

# Why should one recognize the employees?

* + Improve employees morale
	+ Show the company’s appreciation for better performance
	+ Create satisfied workplace
	+ Create highly motivated workplace
	+ Reinforce behavioural patterns
	+ Stimulate creative efforts.

# What is performance appraisal?

Performance appraisal is a systematic and objective assessment or evaluationof performance and contribution of an individual.

# Differentiate Intrinsic and extrinsic rewards.

|  |  |
| --- | --- |
| **Intrinsic rewards** | **Extrinsic rewards** |
| Non-monetary forms of recognition to acknowledge achievement of quality improvement goals. | Profit sharing |
| Celebrations to acknowledge achievement of quality improvement goals. | Gain sharing |
| Regular expressions of appreciation by managers and leaders to employees to acknowledge achievement of quality improvement goals. | Employment security |

|  |  |
| --- | --- |
| 360 degree performance appraisal- feedback from co subordinates or customers is incorporated intoperformance appraisal | Compensation time |
| Formal suggestion system available for individuals to make quality improvement suggestions. | Individual based performance Systems |
| Development based performance appraisals. | Quality based performance Appraisals |

* 1. **How will you improve the performance appraisal system?**
		+ Use rating scales that have few rating categories.
		+ Require work team or group evaluations that are at least equal in emphasis to individual-focused evaluations.
		+ Require more frequent performance reviews where such review will have a dominant emphasis on future planning.
		+ Promotion decisions should be made by an independent administrativeprocess that draws on current-job information and potential for the newjob.
		+ Include indexes of external customer satisfaction in the appraisal process.
		+ Use peer and subordinate feedback as an index of internal customer satisfaction.
		+ Include evaluation for process improvement in addition to results.

# What are the benefits of performance appraisal?

* + - It provides useful feedback to the employee, supervisor and personnel specialists and allows them to take corrective measures to improve performance further.
		- It helps in determining the pay adjustments, increments and bonuses as it rates themerit of the employee
		- It provides basis for employee promotion, transfer or demotion.
		- It helps the employee to plan their career.

# What is the process of performance appraisal?

* + Establish performance standards
	+ Communicate performance expectations to employee
	+ Measure actual performance
	+ Compare actual performance with standards
	+ Discuss the appraisal with the employee
	+ If necessary, initiate correction action

# What are the benefits of employee involvement? (MAY/JUNE 2016, MAY/JUNE2013)

Employee Involvement improves quality and increases productivity because

* + - Employees make better decisions
* Employees are more likely to implement and support decisions they had a part in making.
* Employees are better able to spot and pinpoint areas for improvement.
* Employees are better able to take immediate corrective action.
* Employee involvement reduces labor/management hassle by more effective communications and cooperation.
* Employee involvement increases morale by creating a feeling of belonging to the organization.
* Employees are better able to accept change because they control the work environment.
* Employees have an increased commitment to unit goals because they are involved.

# What are the basic ways for a continuous process improvement? (May 2017)

* + Reduce resources
	+ Reduce errors
	+ Meet or exceed expectations of downstream customers
	+ Make the process safer
	+ Make the process more satisfying to the person doing it.

# What are the types of quality problems?

Compliance problems, Unstructured problems, Efficiency problems, Process Design problems, Product- design problems.

# What are the four R’s of improvement strategies?

* + Repair strategy
	+ Refinement strategy
	+ Renovation strategy
	+ Reinvention strategy

# What are the steps in the PDSA cycle?

The basic Plan-Do-Study-Act is an effective improvement technique.

* + Plan carefully what is to be done
	+ Carry out the plan
	+ Study the results
	+ Act on the results by identifying what worked as planned and what didn’t.

# What are the benefits of PDSA cycle?

* + Daily routine management- for the individual and /or the team
	+ Problem solving process
	+ Project management
	+ Continuous development
	+ Vendor development
	+ Human resources development
	+ New product development
	+ Process trials

# What are the phases of a Continuous Process Improvement Cycle?

* + Identify the opportunity
	+ Analyze the process
	+ Develop the optimal solutions
	+ Implement
	+ Study the results
	+ Standardize the solution
	+ Plan for the future

# Define 5S? ( NOV/DEC 2013)

**5S** Philosophy focuses on effective work place organization and standardized work procedures. 5S simplifies your work environment, reduces waste and non-value activity while improving quality efficiency and safety.

**Sort - (Seiri)** the first S focuses on eliminating unnecessary items from the workplace.

**Set In Order (Seiton)** is the second of the 5Ss and focuses on efficient and effective storage methods.

**Shine: (Seiso)** Once you have eliminated the clutter and junk that has been clogging your work areas and identified and located the necessary items, the next step is to thoroughly clean the work area.

**Standardize: (Seiketsu)** Once the first three 5S’s have been implemented, you shouldconcentrate on standardizing best practice in your work area.

**Sustain: (Shitsuke)** This is by far the most difficult S to implement and achieve. Once fully implemented, the 5S process can increase morale, create positive impressions on customers, and increase efficiency and organization.

# What is a Kaizen? ( NOV/DEC 2012 , May 2017, June/July 2021)

Kaizen is a Japanese word for the philosophy that defines management’s role in continuously encouraging and implementing small improvements involving everyone. It is the process of continuous improvement in small increments that make the process moreefficient, effective, under control and adaptable.

# Define supplier partnering. (NOV/DEC 2014)

Partnering is defined as a continuing relationship between a buying firm and supplying firm, involving a commitment over an extended time period, an exchange of information,and acknowledgement of the risks and rewards of the relationship.

# List the benefits of partnering.

* + - Improved quality
		- Reduced cost
		- Increased productivity
		- Increased efficiency
	+ Increased market share
	+ Increased opportunity for innovation
	+ Continuous improvement of products/ services.

# What are the three key elements to a partnering relationship?

* + Long-term commitment
	+ Trust
	+ Shared vision

# What are the three types of sourcing?

* + Sole sourcing : Use of only one supplier for the organization
	+ Multiple sourcing : Use of two or more supplier for an item.
	+ Single sourcing: Use of one supplier for an item when several sources are available.

# List the various stages for supplier selection and evaluation.

* + Survey stage
	+ Enquiry stage
	+ Negotiation and selection stage
	+ Experience stage

# What are the conditions for selection and evaluation of suppliers?

I.)The supplier understands and appreciates the management philosophy of the organization.

II.) The supplier has a stable management system.

III.) The supplier maintains high technical standards and has the capability of dealing with future technological innovations.

IV.) The supplier can supply precisely those raw materials and parts required by the purchaser, and those supplied meet the quality specifications.

V.) The supplier has the capability to produce the amount of production needed or can attain that capability.

VI.) There is no danger of the supplier breaching corporate secrets.

VII.) The price is right and the delivery dates can be met. In addition, the supplier iseasily accessible in terms of transportation and communication.

VIII.)The supplier is sincere in implementing the contract provisions.

IX.) The supplier has an effective quality system and improvement program such as ISO/QS 9000.

X.)The supplier has a track record of customer satisfaction and organization credibility.

# Define supplier rating and list its objectives. (MAY/JUNE 2015)

A supplier rating system, also referred as a scorecard system, is used to obtain an overall rating of supplier performance.

Objectives:

* + Obtain an overall rating of supplier performance
	+ Ensure complete communication with suppliers
	+ Provide each supplier about the details of problems for corrective action
	+ Maintain and improve the partnering relationship between the customer and the supplier.

# Write an example for quality policy statements. (June/July 2021).

**Vision Statement:** “To be the leading customer battery company in the world”**- Duracell International.**

**Mission Statement:** “We exist to create, make and market useful products and services to satisfy the needs of our customers throughout the world”**- Texas Instruments.**

**Quality Policy Statements:** “To be the best. This policy requires that every individual and operating unit fully understand the requirements of their customers, and deliver products and services that satisfy these requirements at a defect free level”**- ChryslerCorporation**

# What are the requirements of reliable supplier rating? (NOV/DEC 2016).

The requirements of reliable supplier rating is

* + Quality
	+ Price
	+ Performance
	+ Production Capability

# How employee involvement can be improved in an organization? ( NOV/DEC2016)

* + Giving employee the responsibility
	+ Training employee to accept responsibility
	+ Communicating and giving feedback
	+ Giving rewards and recognition

# What are the functions of Quality circles? (MAY/JUNE 2016)

* + The problem solving capacity of the workers
	+ Team work
	+ The cultivation and assimilation of positive values and work ethics
	+ Involvement and interest in work
	+ High motivation for work
	+ Awareness of responsibility towards oneself, the group, the department /office and the nation.

# What is a quality circle? (May 2017, NOV / DEC 2018)

A Quality Circle also known as Quality Control Circle is a small, voluntary group of employees and their supervisor(s), comprising a team of about 6 to 10 members from within same work area or doing similar works, that meet regularly to solve problemsto their job scope or workplace.

# List the common barriers to team progress. (APR / MAY 2018)

* Insufficient training. ...
* Incompatible rewards and compensation.
* First-line supervisor resistance.
* Lack of planning.
* Lack of management support.
* Access to information systems.
* Lack of union support.
* Project scope too large.

**PART B (C404.2)**

1. Explain the concepts of Leadership? ( **MAY/JUNE 2014.)**
2. Explain the strategic planning process in detail. **(MAY/JUNE 2013), (NOV/DEC 2016)**
3. Discuss the importance of “employee involvement” for enhancing quality. (**MAY 2015)**
4. Brief on Employee empowerment. (**NOV/DEC 2012)**
5. Explain the team and teamwork in detail. ( **NOV/DEC 2012,MAY/JUNE 2013, NOV/DEC 2013, NOV/DEC 2014, MAY/JUNE 2014)**
6. What is quality circle? Explain its characteristics, objectives, benefits and pitfalls of quality

circle?

1. Explain the structure of quality circle and the process of quality circle.
2. Write about the system of recognition and reward followed in an organization.

# (NOV/DEC 2011)

1. Explain in detail about performance appraisal. (**NOV/DEC 2011, NOV/DEC 2013)**
2. Explain continuous process improvement the PDSA or PDCA cycle? (**NOV/DEC 2011, NOV/DEC 2012,MAY/JUNE 2013,NOV/DEC 2013, NOV/DEC 2016 & MAY/JUNE 2016, APR / MAY 2018, June/ July 2021).**
3. Compare and contrast the role of a team leader and facilitator. **(NOV / DEC 2018)**
4. Discuss about the supplier partnership procedures in detail. **(NOV / DEC 2018)**
5. Explain 5S Concept. (**NOV/DEC 2011 & MAY/JUNE 2016 ,Dec 2017, APR / MAY 2018)**
6. Explain Kaizen principle? (**MAY/JUNE 2014,NOV/DEC 2014)**
7. What is supplier partnering? Indicate its important benefits. (**NOV/DEC 2016)**
8. Explain the various stages and conditions in Supplier selection.
9. What are the benefits of employee involvement? Explain in detail. (**NOV/DEC 2014)**
10. Portray the characteristics of empowered employees. (**NOV/DEC 2016)**
11. Explain McGregors theory X and theory Y? **(May 2017).**
12. List the five levels in Maslow’s hierarchy of needs. Describe each level and how itmotivates employee. (**APR / MAY 2018)**
13. Explain Juran’s Trilogy in detail**. (June/ July 2021).**

# UNIT-III - TQM TOOLS AND TECHNIQUES I PART-A (C404.3)

* 1. **Give the seven tools of quality? ( MAY/JUNE 2015)**
* Process Flow Diagram (or) Flow chart
* Check Sheets
* Histogram
* Pareto Diagram
* Cause-and-Effect Diagram
* Scatter Diagrams
* Control Charts

# Define flow chart.

* + - A flow chart, also known as process flow chart, flow diagram and process deployment flow, is a diagrammatic view of the various steps in sequential order that form an overall process in an organization.
		- Flow charts are used in the quality management for depicting the steps of a process in an easily understandable form, by using standard symbols.
		- Flow chart is a simple mapping tool that shows the sequence of actions within a process, in a form that is easy to read and communicate.

# Define check sheet.

* + - A check sheet is also called as data collection sheet, tally sheet.
		- A check sheet is a form for systematic data gathering and registering to get a clearview of the facts.
		- It is used to keep track of how often something occurs.
		- The form of the check sheet is tailored for situation or application.

# When a check sheet is used and how to construct it?

A check sheet is used to indicate the frequency of a certain occurrence.

# Construction of check sheet:

* Formulate the objective for collecting data.
* Decide which data is necessary
* Determine who and how data will be analyzed
* Draw a format to record data
* Collect and record data problem- wise by putting tally lines.
* Start counting by tallying on the list: represent the numbers 1,2,3,4 and 5 respectively.
* Mark on the list the total number of facts, which were noticed.

# List the types of check sheet. (MAY/JUNE 2016)

* Process distribution check sheet
* Defective item check sheet
* Defect location check sheet
* Defect factor check sheet

# Define Histogram.

A histogram is a bar chart/diagram showing a distribution of variable quantities or characteristics. It is a graphical display of the frequency distribution of the numerical data. The data are displayed as a series of rectangles of equal width and varying heights.

# List the types of Histogram.

* Bell Shaped Histogram
* Double- peaked Histogram
* Plateau
* Comb
* Isolated peak
* Edged peak

# Define CE.

* + - The cause and effect (CE) diagram is a graphical tabular chart to list and analyze the potential causes of a given problem.
		- The cause and effect diagram is also called as fishbone diagram because of its appearance and the Ishikawa diagram after the man who developed it in 1943.
		- The diagram consists of a central stem leading to the effect with multiple branches coming off the stem listing the various groups of possible causes of the problem.

# Define Pareto diagram.

* + - A Pareto diagram is a diagnostic tool commonly used for separating the vital few causes that account for a dominant share of quality loss.
		- The Pareto diagram is based on the Pareto principle, which state that a few of the defects accounts for most of the effects.
		- Pareto analysis is also called as 80/20 rule and as ABC analysis. It means only 20% of problems (defects) account for 80% of the effects.
		- This analysis is a method of classifying items, events or activities according to their relative importance.

# What is a scatter diagram? ( NOV/DEC 2014)

The scatter diagram is a simple graphical device to depict the relationship between two variables.

* + - A scatter diagram is composed of a horizontal axis containing the measured values of one variable and a vertical axis, representing the measurements of the variable.
		- This diagram displays the paired data as a cloud of points. The density and direction of the cloud indicate how the two variables influence each other.
		- This diagram cannot prove that one variable causes the other, but they do indicate the existence of a relationship as well as the strength of that relationship.

# List the different types of scatter diagram patterns.

* + - Strong Positive Correlation: The value of Y clearly increases as the value of X increases.
		- Strong Negative Correlation: The value of Y clearly decreases as the value of X increases.
		- Weak Positive Correlation: The value of Y increases slightly as the value of X increases.
		- Weak Negative Correlation: The value of Y decreases slightly as the value of X increases.
		- Complex Correlation: The value of Y seems to be related to the value of X, but the Relationship is not easily determined.
		- No Correlation: there is any demonstrated connection between the two variables.

# Give the purpose of scatter diagram.

The purpose of the scatter diagram is, therefore, to display what happens to one variablewhen another variable is changed.

This diagram is used to understand, why particular variations occur and how they can becontrolled.

# Construct an scatter diagram.

* Select variables which are related to each other
* Collect data
* Create scatter diagram

X Axis:: cause or independent variable Y Axis: : Effect or dependent variable

* Examine the shape of cloud of points
* Determine the type and strength of the mutual relationship.

# Define control chart.

A control chart is a graph that displays data taken over time and the variations of this data. A control chart illustrates the dynamic performance of the process. This is based on a series of random samples taken at regular intervals.

# List the types of control chart.

Control chart for variables = for measurable data eg: time

Control chart for characteristics = for quantifiable data such as number of defects

# What is the purpose of Control chart?

The purpose of control chart is to identify when the process has gone out of statistical control, thus signaling the need for some corrective action to be taken.

# What are the new seven managementtools? (June/July 2021).

1. Affinity Diagram
2. Interrelationship Digraph (or) Relationship diagram
3. Tree Diagram
4. Matrix Diagram
5. Prioritization Matrices (or) Matrix data analysis
6. Process Decision Program Chart (or) decision tree
7. Activity Network diagram (or) Arrow diagram

# Define Affinity diagram*.*

* + - An affinity diagram is a tool to collect a large amount of verbal expressions and organize then in according to natural relationship between individual items.
		- This diagram is also referred to as a KJ diagram after its inventor Jiro Kawakita.
		- This is a special kind of brainstorming tool.

# What is the purpose of affinity diagram?

* + - To provide a visual representation of large amount of ideas.
		- To determine logical priorities.
		- To extract the large amount of useful information from few or scattered data, or from unrelated ideas.
		- To understand and organize problems that are not clear.
		- To create new concepts.

# Give the procedure to construct Affinity diagram*.*

* Define problem
* Generate ideas
* Record ideas on cards
* Display cards in random order
* Arrange cards in grouping
* Create headers for grouping
* Draw the affinity diagram

# Define relationship diagram*.*

Relationship diagram is a tool for finding causes to a problem. The basic logic behind the tool is the same as those of the cause and effect diagram. This diagram not only clarifies the relationship between cause and effect but also between the various causes. It is a graphical representation of all factors in a complicated problem, system or situation.

# What is the purpose of relationship diagram?

To generate a visual representation of the relations between an affect and its cause as wellas the inter relationship between the different causes of the problem.

This tool can be used to Identify key problem from a list of important problems;

* Identify the root cause of existing problems;
* Identify key factors needed to make a decision.

# Define tree diagram.

A tree diagram systematically breaks down a topic into its components elements and

shows the logical and sequential links between these elements. The tree diagram systematically outlines the complete spectrum of paths and tasks that must be carried out to achieve a goal.

# List the uses of tree diagram.

* + - The purpose of tree diagram is to explore the ways and means to achieve the objective, develop a list of alternative means and to present them in visual understandable form.
		- It helps to develop a systematic, step by step, strategy to achieve an objective.

# How to construct tree diagram.

* State the problem to be studied
* Brainstorm all possible causes or methods of addressing the problem.
* Identify and list the primary, secondary and tertiary means from brainstorm
* Arrange and rearrange the elements in proper order in boxes.

# Define Matrix diagram.

A matrix diagram is a tool that is used to systematically organize information that must becompared on a variety of characteristics in order to make a comparison, selection or choice. It is a tool which the relations between two sets of factors in the form of a table ora matrix.

Matrix diagram, sometimes referred as a “quality table”, is the starting point in building a“house of quality”.

# List the types of matrix diagram.

* L-shaped
* T-shaped
* Y-shaped
* C-shaped
* X-shaped
* Roof- shaped

# How to draft matrix diagram?

* First decide on the two sets of factors to be compared.
* Place the main factors vertically on the left hand side of the matrix and the dependent factors horizontally on top of the matrix.
* In the main body of the matrix, place appropriate symbols at the intersecting square boxes denoting the relationship between the two factors.
* Now score relationships and select most important relationship for analysis.

# Define decision tree.

* + - A Process Decision Programme Chart (PDPC), also known as decision tree, is aplanning tool to outline every conceivable and likely occurrence in any planning.
		- The PDPC forces proactive thinking on what can go wrong with one’s plan and whatwould one do to overcome the effect of such adverse occurrences.
		- This tool helps to anticipate undesirable occurrences and enables one to prepare withplans to neutralise their effect.

# List the uses of decision diagram. (MAY /JUNE 2018)

* The PDPC is useful when one wants to plan all possible chains of events that might occur during a project.
* This tool is particularly used in new product development, building and equipment and data processing programs.
* This tool is widely used in decision making when the task is new, complex and unique.

# How to construct decision tree.

* First, prepare a “normal” flow chart of the process with all expected events as steps in the chart.
* Identify the various possibilities of the process not going as per the plan due to any abnormal occurrences.
* Write these occurrences on the flow chart through branching at appropriate locations.
* Now identify the ways and means to counter the effect due to abnormal occurrences.
* Write these counter-measures in rectangles connecting the corresponding abnormal occurrence on one side and the process objective on the other.

# Define Arrow diagram.

An arrow diagram is a graphic description of the sequential steps that must be completed before a project can be completed. The PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method) charts are the best known arrow diagram. It is a planning tool that determines the critical path of a process or a project.

# Give some of the uses of Arrow diagram.

* To show the paths to complete a
* To find the shortest time possible for the project.
* To display graphically simultaneous activities.
* This diagram is indispensable for long term projects.

# How to construct Arrow diagram.

* Identify and list each activity to be done in the project.
* Determine the sequence of activities
* Construct a network reflecting the precedence relationships
* Write the activity time under arrow leading from it.

# Define Matrix data Analysis diagram.

A matrix data analysis diagram is very much similar to a matrix diagram with a difference that numerical data is used instead of symbols indicating the existence and strength of relationship. It is the only tool among the “New Seven Management Tools” which uses numerical data and produces numerical results.

# Give some of the uses of Matrix data Analysis diagram or Prioritization matrix. (NOV/DEC 2014)

* To present numerical data about two sets of factors in a matrix form and analyses it to get numerical output.
* This tool is used in “Principal Component Analysis” where only two characteristics can be studied at a time.
* This tool is advantageous in studying the parameters of production processes, in analyzing market information, in finding links between numerical and non-numerical variables and so on.

# How to construct Matrix data Analysis diagram.

* Decide the two factors whose relations are to be analysed
* Check the number of individual items in the two factors
* Prepare a matrix to accommodate all items of the two factors
* Enter numerical data in the matrix
* Analyse the final results

# Define Six Sigma (or) primary objectives of six sigma? (Dec 2017, May2017, June/ July 2021).

Six-Sigma is a business process that allows organizations to drastically improve their bottom line by designing and monitoring every day business activities in ways that minimize waste and resources while increasing customer satisfaction. It is achieved through continuous process measurement, analysis & improvement.

Six sigma is a systematic method for process and product improvement and for measuring performance variation. It is also a metric for evaluating performance quality and a standard of excellence.

## Write down the five steps of Six sigma. DMAIC:

* Define
* Measure
* Analyze
* Improve
* Control

# List the advantages of six sigma.

* Improved customer satisfaction
* Improved quality, efficiency and cost of production sold
* Creation of self sustaining responsibilities
* Standardization

# Write down the steps to achieve six sigma state.

Step1: Identify the process you create or service you provide.

Step2: Identify the customers for your product or service and determine what theyconsider important.

Step3: Identify your needs to provide the product or service that satisfies the customer.Step4: Define the process for doing the work.

Step5: Mistake-Proof the process and eliminate waste effort.

Step6: Ensure continuous improvement by measuring, analyzing and controlling the improved process.

# Define Benchmarking and give the objectives of Benchmarking. ( MAY/JUNE 2015, NOV/DEC 2018).

Benchmarking is the process of determining who is the very best, who sets the standard, and what that standard is. Benchmarking can provide them with data to show what can be achieved and how can be achieved.

## OBJECTIVES:

* It aims at a goal setting process to facilitate comparison with the best.
* It aims at motivating and stimulating company employees towards the goal of continuous quality improvement.
* It aims at external orientation of the company.
* It aims at identifying a technological breakthrough.
* It aims at searching for industry best practices.

# List the types of Benchmarking. (Nov 2016) Classification based on the Object to be Benchmarked

* Product Benchmarking
* Performance Benchmarking
* Process Benchmarking
* Strategic Benchmarking
* Generic Benchmarking

# Classification based on the Organisations against whom one is Benchmarking

* Internal Benchmarking
* External Benchmarkingi
* Industry Benchmarking
* Competitive Benchmarking
* Best-in class Benchmarking
* Relationship Benchmarking

# List the steps in benchmarking.

* Phase I: Planning
* Phase II: Analysis
* Phase III: Integration
* Phase IV: Action
* Phase V: Maturity

# List the benefits and pitfalls of Benchmarking.Benefits:

* Creating a culture that values continuous improvement to achieve excellence.
* Sharing the best practices between benchmarking partners
* Prioritizing the areas that need improvement.
* Enhancing creativity by devaluing the not-invented-here syndrome.
* Increasing sensitivity to changes in the external environment.

# Pitfalls:

* + This is based on learning from others, rather than developing new and improved approaches.
	+ Benchmarking should not be a substitute for innovation.
	+ It must be a mere improvement tool.

# What is FMEA? (NOV/DEC 2013)

Failure and Effect Analysis, also known as Risk analysis, is a preventive measure to systematically display the causes, effects and possible actions regarding observed failures.

The objective of FMEA is to anticipate failures and prevent them from occurring. FMEAprioritises failures and attempts to eliminate their causes.

# List the types of FMEA.

* System FMEA
* Design FMEA
* Process FMEA
* Service FMEA
* Equipment FMEA
* Maintenance FMEA
* Concept FMEA
* Environmental FMEA

# List some of the benefits of FMEA.

* Improve Product/ Process reliability and quality.
* Increase customer satisfaction
* Early identification and elimination of potential product/process failure modes.
* Prioritize Product/Process deficiencies.
* Capture engineering/organization knowledge
* Document and track the actions taken to reduce risk.
* Provide focus for improved testing and development.
* Minimize late changes and associated cost.
* Act as catalyst for teamwork and idea exchange between functions.

# What are the stages of FMEA methodology? (May 2016)(Dec 2017)

**Stage1**: Specifying Possibilities

a. Functions b. Possible failure modes c. Root causes d. Effects

e. Detection/Prevention

**Stage2**: Quantifying Risk

a. Probability of cause b. Severity of effect c. Effectiveness of control to prevent cause

d. Risk priority number

**Stage3:** Correcting High Risk Causes

a. Prioritizing work b. Detailed action c. Assigning action responsibility

d. Check points on completion

**Stage4**: Re-evaluation of Risk

a. Recalculation of risk prioritynumber

# What are the reasons for the benchmarking? (MAY/JUNE 2013, MAY/JUNE 2014)

* It aims at a goal setting process to facilitate comparison with the best.
* It aims at motivating and stimulating company employees towards the goal ofcontinuous quality improvement.
* It aims at external orientation of the company.
* It aims at identifying a technological breakthrough.
* It aims at searching for industry best practices.
	1. **Why is brainstorming considered as an effective tool? (MAY/JUNE 2014)** Brainstorming is a popular tool that helps you generate creative solutions to a problem. It is particularly useful when you want to break out of stale, established patterns of thinking, so that you can develop new ways of looking at things. It also helps youovercome many of the issues that can make group problem-solving a sterile and unsatisfactory process.

# Mention any four traditional tools of quality?

* + Process Flow Diagram (or) Flow chart
	+ Check Sheets
	+ Histogram
* Pareto Diagram
* Cause-and-Effect Diagram
* Scatter Diagrams
* Control Charts

# PART B (C404.3)

1. Explain the QC or SPC tools? **(MAY/JUNE 2014, NOV/DEC 2014, Dec 2017,NOV/DEC 2018).**
2. Explain the New Seven Management Tools? **(MAY/JUNE 2013,NOV/DEC 2013,MAY/JUNE 2014, NOV/DEC 2014,MAY/JUNE 2016 , NOV/DEC 2016,June/July 2021).**
3. Explain the Process of Six Sigma? (**MAY/JUNE 2013,MAY/JUNE 2014,NOV/DEC14, MAY/JUNE 15)**
4. Explain the responsibilities of members of six sigma team and list the advantages ofsix

sigma. (OR)

1. Explain the relevance of 6 sigma concept in achieving quality output in a process. Also, discuss about a company practicing six-sigma concept. **(June/July 2021).**
2. Explain the Bench marking Process and reasons to Benchmark? **( MAY/JUNE 2013,May 2017, June/ July 2021).**
3. Explain the various types of benchmarking in detail. **(MAY/JUNE 2017, MAY /JUNE**

# 2018, NOV/DEC 2018)

1. Explain the Benchmarking process in detail. **(MAY/JUNE 2014, NOV/DEC 2013)**
2. List out the advantages and disadvantages of benchmarking. (Or) What benefits have been achieved by the organization that have successfully completed their benchmarking programs? **(Nov 2016)**
3. What is FMEA? Explain the stages of FMEA? **(MAY 2016 , DEC 16, May 2017, Dec2017)**
4. Explain the FMEA procedure with a form. **(MAY/JUNE 2015 ,MAY/JUNE 2016 , NOV/DEC 16)**
5. Compare six sigma and TQM concepts **(Nov 2016)**

# UNIT IV-TQM TOOLS AND TECHNIQUES II

PART-A

* 1. **Define Control charts.**

**Control charts** also known as **Shewhart charts** (after [Walter A. Shewhart](https://en.wikipedia.org/wiki/Walter_A._Shewhart)) or **process- behavior charts**, in [statistical process control](https://en.wikipedia.org/wiki/Statistical_process_control) are tools used to determine if a manufacturing or [business process](https://en.wikipedia.org/wiki/Business_process) is in a state of [statistical control.](https://en.wikipedia.org/wiki/Statistical_control)

* 1. **Define process capability. (MAY/JUNE 2016 ,NOV/DEC 2016,NOV/DEC 2018)** The process capability is a measurable property of a process to the specification, expressed as a [process capability index](https://en.wikipedia.org/wiki/Process_capability_index) (e.g., Cpk or Cpm) or as a [process](https://en.wikipedia.org/wiki/Process_performance_index) [performance](https://en.wikipedia.org/wiki/Process_performance_index) [index](https://en.wikipedia.org/wiki/Process_performance_index) (e.g., Ppk or Ppm). The output of this measurement is usually illustrated by a [histogram](https://en.wikipedia.org/wiki/Histogram) and calculations that predict how many parts will be produced out of specification (OOS).

Two parts of process capability are: 1) measure the variability of the output of a process, and 2) compare that variability with a proposed specification or product tolerance.

# Define Six Sigma. (NOV/DEC 2018)

Six Sigma is a management philosophy developed by Motorola that emphasizes extremely high objectives, collecting data, and analyzing results to a fine degree as a wayto reduce defects in products and services. The Greek letter *sigma* is sometimes used to denote variation from a standard. The philosophy behind Six Sigma is that if you measure how many defects are in a process, you can figure out how to systematically eliminate them and get as close to perfection as possible.

In order for a company to achieve Six Sigma, it cannot produce more than 3.4 defects per million opportunities, where an opportunity is defined as a chance for nonconformance.

# Define two Six Sigma processes.

There are two Six Sigma processes: Six Sigma DMAIC and Six Sigma DMADV, each term derived from the major steps in the process.

Six Sigma DMAIC is a process that defines, measures, analyzes, improves, and controls existing processes that fall below the Six Sigma specification.

Six Sigma DMADV defines, measures, analyzes, designs, and verifies new processes or products that are trying to achieve Six Sigma quality.

All Six Sigma processes are executed by Six Sigma Green Belts or Six Sigma Black Belts, which are then overseen by a Six Sigma Master Black Belts, terms created by Motorola.

# Give The Differences of DMAIC and DMADV.

DMAIC and DMADV sound very similar. The acronyms even share the first three letters. But that is about where the similarities stop.

# When to Use DMAIC

The DMAIC methodology, instead of the DMADV methodology, should be used when a product or process is in existence at your company but is not meeting customer specification or is not performing adequately.

The DMADV methodology, instead of the DMAIC methodology, should be used when:

* A product or process is not in existence at your company and one needs to be developed
* The existing product or process exists and has been optimized (using either DMAIC or not) and still does not meet the level of customer specification or Six Sigma level

# Define Quality cost.

Quality cost is the cost of not meeting the customer’s requirement that is the cost of doing things wrong.

Quality costs are defined as those costs associated with the non- achievement of product/ service quality as defined by the requirements established by the organisation and its contracts with customers and society.

Quality cost is the cost of poor product or services.

# Give some examples for quality cost.

* Rewriting an insurance policy to match customer expectations.
* Redesigning a faulty component that never worked right
* Reworking a shock absorber after it was completely manufactured.
* Retesting a computer chip that was tested incorrectly
* Rebuilding a tool that was not built to specifications.
* Responding to a customer’s complaint

# What are the various types of quality costs?

* Costs of prevention
* Costs of Appraisal
* Costs of Internal Failure Costs of external Failure

# What is prevention cost?

Costs of prevention: Prevention costs are the costs that occur when a company is performing activities designed to prevent quality problems from arising in products or services. Prevention costs relate to efforts to prevent failures.

# What is appraisal cost?

Appraisal costs are associated with measuring, evaluating or auditing products or services to ensure that they conform to specifications or requirements.

Appraisal costs relate to testing, execution and examination to assess whether specified quality is being maintained.

# What is internal cost?

Internal failure costs arise due to internal failures. These costs are linked to correcting mistakes before delivery of the product, such as: scrap, rework, remaking, reinspection, retesting and sales discounts for inferior products.

Internal costs are costs associated with product non- conformities (or service failures) found before the product is hipped (or the service is provided) to the customer.

# What is externalfailure costs? (June/July 2021).

External failure costs arise from the rejection of the products/ services by the customers due to poor quality.

The external failure costs are tests that occur when non conforming product or service reaches the customer.

These costs are associated with the adjustments of malfunctions after delivery of the product, such as: repair costs, travel and lodging expenses, replacement costs, stock spare parts, lost goodwill of customer, guarantee and warranty costs and dispatchment costs.

# What are the various analysis techniques for quality costs? Trend Analysis:

A trend analysis or a trend graph is a planning tool that provides information for long range planning. It also provides information for the investigation and assessment of quality improvement programmes.

# Pareto Analysis:

A pareto analysis is a method of classifying items, events or activities according to their relative importance.

A pareto diagram is a diagnostic tool commonly used for separating the vital few causes that account for a dominant share of quality loss.

The pareto diagram is based on the pareto principle, which states that a few of the defects accounts for most of the effects.

# What is a QFD? ( NOV/DEC 2018)

Quality Function Deployment is a planning tool used to fulfill customer expectations. It isa disciplined approach to product design, engineering, and production and provides in- depth evaluation of a product.

QFD may be defined as a system for translating customer requirements into appropriate requirements at every stage, from research through product design and development, to manufacture, distribution, installation and marketing, sales and service.

# Give the objectives of QFD. (Dec 2017)

* + - To identify the true voice of the customer and to use this knowledge to develop products which satisfy customers.
		- To help in the organization and analysis of all the pertinent information associated withthe project.
		- QFD aims at translating the customer’s voice (or requirements) into product

specifications.

# How to capture the voice of the customer?

The various sources of capturing the customer expectations include:

* + Direct discussions or interviews
	+ Customer surveys
	+ Market surveys
	+ Trade trials
	+ Focus group Customer visits
	+ Consultant
	+ Observation
	+ Warranty data
	+ Customer audits
	+ Customer complaints
	+ Field reports
	+ Standards
	+ Government regulations

# Define House of Quality. (MAY /JUNE 2018)

* + - The primary planning tool used in QFD is the House of Quality (HOQ).
		- The House of Quality converts the voice of the customer into product design characteristics.
		- QFD uses a series of matrix diagrams, also called, “quality tables”, that resemblesconnected houses.

# What are the parts of house of quality (QFD Deploy)? ( NOV/DEC2011)

1. Customer requirements
2. Prioritized customer requirements
3. Technical descriptors
4. Relationship matrix
5. Trade-off Matrix
6. Prioritized Technical Descriptor

# How will you Construct a house of quality? (or) QFD Methodology.

1. List customer requirements
2. List technical descriptors
3. Develop a relationship matrix between WHATs and HOWs
4. Develop an interrelationship matrix between HOWs
5. Competitive assessments
6. Develop prioritized customer requirements
7. Develop prioritized technical descriptors

# What are the phases of QFD process?

* + Product Planning
	+ Part Development
	+ Process Planning
	+ Production planning

# List the Steps in Product Planning.

* + List Customer Requirements (WHATs)
	+ List technical descriptors (HOWs)
	+ Develop a relationship matrix between WHATs and HOWs
	+ Develop an interrelationship matrix between HOWs
	+ Do competitive assessments
	+ Develop prioritized customer requirements
	+ Develop prioritized technical descriptors

# List the Steps in Part Development.

* + - Deploy QFD process down to sub-components level both in terms of requirements andcharacteristics
		- Deploy the component deployment chart. Relate the critical sub-component controlcharacteristics.

# List the Steps in Process Planning.

* + Develop the relationship between the critical characteristics and process used to create the characteristics.

 Develop the control plan relating critical control to critical processes.

# List the Steps in Production Planning.

* + Tabulate operating instructions from process requirements.
	+ Develop prototype and do testing.
	+ Launch the final product to the market.

# What are the benefits of QFD?

* + Improves customer satisfaction
	+ Promotes team work
	+ Concentrates on designeffort
	+ Introduce new design to the marketfaster
	+ Facilitates better understanding of designinteractions
	+ Minimizes the number of later engineering changes.
	+ Reduces overall costs of design and manufacture

# List the users of QFD.

* + Currently many U.S. and Japan companies are using QFD
	+ In the automobile industry, Ford, Chrysler, and General Motors are users of QFD
	+ In the electronics field, Digital Equipment Corporation and Texas instruments havebeen QFD pioneers
	+ Numerous other companies use QFD including : Procter & Gamble, Deere & company, The Kendall Company, Polaroid, Rockwell International, Hughes Aircraft, and Hewlett- Packard.

# Define Taguchi method.

Taguchi methods are statistical methods developed largely by Genichi Taguchi toimprove the quality of manufactured goods.

# Define Taguchi Loss function. (NOV/DEC 2012, MAY/JUNE 2015)

Taguchi defines quality as” the loss imparted by the product to society from the time the product is shipped.

The essence of the loss function concept is that whenever a product deviates from its target performance, it generates a loss to society

# List some of the use of Taguchi loss function.

* + To improve the quality
	+ To get the market retention

# Write the formula for Taguchi’s QLF.

**Taguchi’s QLF:** L(x)= k(x-N)2

k= C/d2 Where L(x) = Loss functionk= Constant of proportionality

x= Quality characteristics of selected product N= Nominal value of the chosen productC=

Loss associated with the specification limit

d = Deviation of the specification from the target value

# Define maintenance.

Maintenance is defined as the management, control, execution and quality assurance of activities which ensure the achievement of optimum availability and performance of a plant in order to meet business objectives.

# Enumerate the evolution of maintenance.

First generation:

* + Fix it when it broke

c. Second Generation:

* + Higher plant availability
	+ Longer equipment life.
	+ Lower costs.
	+ Longer equipment life.
	+ Greater cost effectiveness.

# List the types of maintenance.

* + Corrective or breakdown maintenance
	+ Scheduled or routine maintenance
	+ Preventive maintenance
	+ Predictive maintenance

d.Third Generation:

* Higher plant availability and reliability
* Greater safety
* Better production quality
* No damage to environment.

# Define Corrective maintenance.

* Corrective maintenance implies that repairs are made after the failure of machine or equipment.
* It says wait until a failure occurs and then remedy the situation as quickly as possible.
* For example, replacing the gears in a machine only after the gears get failed and become inoperative.

# Define Scheduled maintenance.

* + - Scheduled maintenance is a stitch in time procedure aimed at avoiding breakdowns.
		- This includes all work undertaken to keep the production equipment in efficient condition. It may cover periodic inspection, cleaning, lubrication, overhaul, repair, replacement, etc.,
		- The two types of scheduled maintenance are Running maintenance

Shutdown maintenance

# Define preventive maintenance.

* Preventive maintenance is carried out before the failure arises or prior to the equipment actually breaks down.
* It is a safety measure designed to minimize the possibility of unanticipated breakdownsand interruptions in production.
* It involves repetitive and periodic upkeep, overhauling, servicing of the equipment to prevent breakdown.

# Define Predictive maintenance.

* In predictive technique, on the prediction of any fault, maintenance is being done. It is comparatively a newer maintenance technique.
* In this technique, equipments condition is measured periodically or on a continuous basis. This enables maintenance staff to take a timely action such as equipment adjustments, repair and overhaul.
* Predictive maintenance extends the service life of equipment without any fear of failure.
* For example, unusual sounds coming out of rotating equipment predict a coming trouble or an electric cable excessively hot at one point predicts a trouble.

# Define TPM? (NOV/DEC 2013)

Total Productive Maintenance (TPM) is the systematic execution of maintenance by all employees through small group activities.

T : Total = All encompassing by maintenance and production individuals workingtogether. P : Productive = Production of goods and services that meet or exceed customer’s expectations.

M : Maintenance = Keeping equipment and plant in as good as or better than te original condition at all times.

# What are the goals of TPM? ( MAY/JUNE2013, June/July 2021).

* + To improve equipment effectiveness
	+ To achieve autonomous maintenance
	+ To plan maintenance
	+ To train staff in relevant maintenance skills
	+ To achieve early equipment management

# What are the 6 big losses? (MAY/JUNE 2014)

|  |  |  |
| --- | --- | --- |
| 1 | Breakdowns | Long interruptions, expensive repairs |
| 2 | Setup and changeover | Taking much longer than needed |
| 3 | Idling and minor stoppages | Hard to quantify, add up to big losses |
| 4 | Reduced speed | Equipment cycle times have graduallyDeteriorated |
| 5 | Defects and rework | Quality losses and unhappy customers. |
| 6 | Start up losses | Too long to get to stecdy state after aChange. |

* 1. **List the eight pillars of TPM.**
	+ Jishu Hozen (or Autonomous Maintenance)
	+ Kobetsu Kaizen (or Individual Improvement)
	+ Planned Maintenance
	+ Hinshitsu Hozen (or Quality Maintenance)
	+ Development Management
	+ Education and Training
	+ Safety, Health and Environment
	+ Office TPM

# Give the seven basic steps to get an organization started toward TPM?

1. Management learns the new philosophy
2. Management promotes the new philosophy
3. Training is funded and developed for everyone in the organization
4. Areas of needed improvement are identified
5. Performance goals are formulated
6. An implementation plan is developed
7. Autonomous work groups are established

# What are the major loss areas?

Planned downtime Unplanned downtime Idling and minor stoppages

Slow-downs

Process nonconformities Scrap

# List some of the benefits of TPM. (MAY/JUNE 2016 ,May 2017)

* + Increased equipment productivity
	+ Improved equipment reliability
	+ Reduced equipment downtime
	+ Increased plant capacity
	+ Extended machine line
	+ Lower maintenance and production costs
	+ Approaching zero equipment –caused defects
	+ Improved work between operators and maintenance people
	+ Enhanced job satisfaction
	+ Improved return on investment
	+ Improved safety

# Define tero technology.

* TPM’s comprehensive role in integration of interrelated activities has been described as terotechnology.
* Terotechnology covers aspects of process installation, commissioning, maintenance engineering, replacement and removal of plant, machinery and equipment , feedback to operators and strengthens relations with other activities.

# Write down the formula of OEE (Overall Equipment Effectiveness) ( NOV/DEC 2011)

Overall Equipment Effectiveness (OEE) = Availability \* { Performance efficiency}\*{ Rate of Quality Products}

# Define Quality circle.

A Quality Circle also known as Quality Control Circle is a small, voluntary group of employees and their supervisor(s), comprising a team of about 6 to 10 members from within same work area or doing similar works, that meet regularly to solve problems to their job scope or workplace.

# What are the objectives of quality circles? or what are the functions of quality circles? (MAY/JUNE 2013, NOV/DEC 2013)

**Objectives:**

* + To promote job involvement
	+ To create problem solving capability.
	+ To improve communication
	+ To promote leadership qualities.
	+ To promote personal development
	+ To develop a greater awareness for cleanliness.
	+ To develop a greater awareness for safety
	+ To reduce errors.
	+ To enhance quality.
	+ To inspire more effective team work.
	+ To build an attitude of problem prevention.

# List the characteristics of quality circles.

Characteristics:

* The optimum number of employees in any quality circle is between 6 to 10.
* The quality circle should have a homogeneous group where participation members must be from within the same department or work area.
* The participation of quality circle members should be voluntary. No compulsion or pressure is to be brought on employees to join or not to join the quality circle.
* The members of quality circle should meet regularly once in a week for an hour after their working hours to discuss the problems related to their work and find solutions.
* The members of the quality circle should themselves identify the problems through various techniques such as brainstorming, cause-effect diagram, Pareto analysis, histograms, etc.

# What are the elements of quality circle? Element of Quality circle:

* + Top management
	+ Coordinator
	+ Steering committee
	+ Facilitator
	+ Leader
	+ Members
	+ Non-members

# What are the benefits of quality circle? (NOV/DEC 2014)

* + Quality circle’s effects on individual’s characteristics
	+ Quality circle’s effects on individual’s relations with others
	+ Quality circle’s effects on workers and their attitude toward the company

# What are the problems and pitfalls of quality circle?

* + Lack of faith in and support to quality circle activities among management personnel.
	+ Lack of interest or incompetence of leaders/facilitator.
	+ Apathy, fear and misunderstanding among middle level executives.
	+ Delay or non- implementation of circle recommendations.  Irregularity of quality circle activities.

# What are the objectives of performance measures?

* + Establish Baseline measures and reveal trends
	+ Determine which processes need to be improved
	+ Indicate process gains and losses.
	+ Compare goals with actual performance
	+ Provide information for individual and team evaluation
	+ Provide information to make informed decision
	+ Determine the overall performance of the organization.

# List the requirements of performance measures.

* + Simple
	+ Few in number
	+ Developed by users
	+ Relevance to customer
	+ Improvement
	+ Cost
	+ Visible
	+ Timely

# What are the techniques commonly used for performance measure presentation?

1. Time series trend graph
2. Control charts
3. Capability index
4. Taguchi’s loss function
5. Costs of poor quality and
6. Quality award.

# Indicate the different parameters used for quality performance measurement. (MAY/JUNE 2015)

**Performance Indicator:**

1.Customers 2.Production 3.Suppliers 4.Research and Development 5.Human Resources

6.Marketing/Sales 7.Administration

# Who constitute a quality circle? (MAY/JUNE 2014)

A Quality Circle is a small, voluntary group of employees and their supervisor, comprising a team of about 6 to 10 members from within same work area or doing similar works, that meet regularly to solve problems relating to their job scope or workplace.

# Write the specific use of np- chart? (NOV/DEC 2016)

The np Chart is to observe and evaluate the behavior of a process over time, and take corrective action if necessary. It plots the number of defective units and is applicable to binomially distributed discrete defect data collected from subgroups of equal size.

# Classify the control charts?(Dec 2017)

**Types of Control Charts: the classification of control charts depend upon the type of data.**

* 1. Variable charts: are meant for variable type of data. **X bar and R Chart**, X bar and sigma chart, chart for the individual units
	2. Attribute chats : are meant for attribute type of data. **p chart, np chart, c chart,** U chart

# PART- B

1. Explain the Control Charts in detail. (**MAY/JUNE 2016)**
2. Explain Process Capability in detail.
3. Explain the concept of SIX SIGMA in detail. (**NOV/DEC 2016,NOV/DEC 2018)**
4. What is quality circle? Explain its characteristics, objectives, benefits and pitfalls of quality circle? (**NOV/DEC 2012)**
5. Explain the structure of quality costs and the process of quality costs. (**NOV/DEC 2012)**
6. Explain the QFD process? What are its objectives and benefits? (**NOV/DEC 2012, NOV/DEC 2013, NOV/DEC 2014, NOV/DEC 2018)**
7. Explain the House of Quality in Quality Function Deployment**? (MAY/JUNE 2013, MAY/JUNE 2015, NOV/DEC 2014, MAY/JUNE 2014, NOV/DEC 2016, June/July 2021).**
8. Derive the Taguchi Loss function. (**DEC 2011, MAY 2013, DEC 14, Dec 2017, June 2021).**
9. Explain the various types of maintenance.
10. What are the goals of TPM? List the basic steps to get an organization started towardsTPM. (**NOV/DEC 2011, NOV/DEC 2012, MAY/JUNE 2015, MAY 2014, May 2017, MAY**

# /JUNE 2018).

1. What is quality cost? Explain the techniques used for of quality cost. (**MAY/JUNE2013, NOV/DEC 2013, MAY/JUNE 2014).**
2. Explain the objectives & benefits of performance measures. (**DEC 2012, DEC 2014, May**

# 2017).

1. Explain the difference between x-bar and R- charts. How can they be used together and why would it be important to use them together? (**NOV/DEC 2016)**
2. Describe a quality control chart and how it can be used. What are the upper and lower control limits? What does it mean if an observation falls outside the control limits? (**NOV/DEC 2016)**
3. Devise a QFD methodology for design and development of cups used in vending
4. machine for dispersing hot and cold beverages. (Case Study) (**MAY/JUNE 2016)**
5. Compare TQM and TPM **(May 2017, Dec 2017)**

**Unit 5**

**Quality Management System**

**PART A**

# What is Quality system?

The Quality systems are the organizational structures, responsibilities,procedures, processes and resources for implementing quality management.

# List the functions of Quality system.

Functions of Quality system:

The system is well understood and effective.

The products or services actually do satisfy customer expectations.

The emphasis is placed on problem- prevention rather than dependence ondetection, after occurrence.

# What is the need for ISO? (Dec 2017,June/July 2021).

The International Organization for Standardization (ISO) was established in 1946in Geneva, Switzerland, where it is still based.

* ISO is an association of National Standards Bodies of more than 150countries.
* ISO is a specialized agency for standardization. The primary objective of ISO is coordination and unification of international standards.
* ISO employs a system of technical committees, sub committees andworking groups to develop international standards. Besides the national standard bodies, ISO permits other international organizations that develop standards to participate in its work, by accepting them as Liaison members.
* ISO works in accordance with an agreed set of rules of procedures, the ISO directives, which also include requirements on the presentation ofstandards.

# What is ISO 9000?

ISO 9000 has become an international reference for quality management requirements in business-to- business dealings. This means what the organizationdoes to fulfill:

* The customer’s quality requirements and
* Applicable regulatory requirements, while aiming to
* Enhance customer satisfaction and
* Achieve continual improvement of its performance in pursuit of theseobjectives.

# Give the ISO 9000 Series of Standards?

* ISO 9000, “Quality Management and Quality Assurance Standards Guidelines for Selection and Use”.
* ISO 9001, “Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation & Servicing”.
* ISO 9002, “Quality Systems - “Model for Quality Assurance in Production, Installation & Servicing”.
* ISO 9003, “Quality Systems - “Model for Quality Assurance in FinalInspection and Test”.
* ISO 9004-1, “Quality Management and Quality System Elements -Guidelines”.

# What is the need for ISO 9000?

ISO 9000 is needed to unify the quality terms and definitions used by industrialized nations and use terms to demonstrate a supplier’s capability of controlling its processes.

# Why should consider ISO 9000 registration?

* Establishes standard operating system for the business
* Emphasizes Continuous Improvement and Prevention instead of Reaction.
* Empowers employees by establishing responsibilities and decision makingprocess
* Improved communication and cooperation within the organization
* Institutes procedures for greater customer satisfaction by joint efforts bymanagement, all employees and the Quality Department.

# Give some other quality systems?

QS-9000 TE-9000 AS9000

# What are the reasons for implementing a quality system that conforms to an ISO standard?

* + Improved employee involvement (average gain is 100%)
	+ Improved housekeeping (average gain is 140 %)
	+ Improved decision making based on facts and data (average gain is 95%)
	+ Improved customer satisfaction (gain is 55 %)
	+ Improved safe working (gain is 45 %)
	+ Reduced customer complaints (about 40%)
	+ Reduced inspection efforts (about 45%)
	+ Reduced quality cost (about 50%)

# Who is responsible for developing the ISO 9000 Standards?

ISO technical committee and its sub committees are responsible for the development of the standards. The work is conducted on the basis of “consensus” among quality and industry experts nominated by the national standards bodies, representing a wide range of interested parties.

# Compare ISO 9001 and ISO 9004.

* ISO 9001 can be used for internal application by organizations for certification or contractual purposes.
* ISO 9004 is not intended for certification or contractual purposes. It is used in non contractual situations.
* ISO 9004 gives guidance on wider range of objectives of a quality management system than ISO 9001, with respect to organization’s continuous improvement and performance.

# What are the benefits of ISO? (Nov/Dec 2012)

* Fewer on-site audits by customers.
* Increased market share.
* Improved quality, both internally and externally.
* Improve product and service quality levels

from suppliers.

* Greater awareness of quality by employees.
* A documented formal systems
* Reduced operating costs.

# List the elements of ISO 9000.

* + Management Responsibility
	+ Quality system
	+ Contract Review
	+ Design control
	+ Document control
	+ Purchasing
	+ Purchaser supplied product
	+ Product Identification and Traceability
	+ Process Control
	+ Inspection and Testing
	+ Inspection, Measuring and Test Equipment
	+ Inspection and Test status
	+ Control of Non-conforming Products
	+ Corrective and Preventive Action
	+ Handling, Storage , Packaging, Preservation and Delivery
	+ Control of Quality Records
	+ Internal Quality Audit
	+ Training
	+ Servicing
	+ Statistical Techniques

# List the steps to implement ISO 9000.

Step 1: Top management Commitment Step 2: Appoint the Management Representative

Step 3: Awareness

Step 4: Appoint an Implementation Team Step 5: Training

Step 6: Time schedule

Step 7: Select Element Owners

Step 8: Review the present systemStep 9: Write the Documents

Step 10: Install the New system Step 11: Internal Audit

Step 12: Management Review Step 13: Preassessment

Step 14: Registration

Step 15: Award of ISO 9000 certificate

# What is the necessity for documentation of quality system? (Apr/May 2018)

* It is understood that the proper documentation is the pre- requisite for implementing quality system.
* The documentation serves as a reference for the management, the staff and other agencies whose involvement is essential for implementation of the quality system.

# What is the advantage of documented quality system?

Advantages of having a documented quality system:

* + Serves as a standardization in work procedures;
	+ Brings about consistency in operations;
	+ Develops confidence amongst employees;
	+ Generates customer’s confidence;
	+ Provides a basis for continuous improvement;

# Draw the Document Pyramid. (Nov/Dec2011)



* 1. **Give some of the guidelines for writing a document.**
* Keep the language simple.
* Follow a simple paragraph numbering system address one idea per paragraph.
* Use 13 or 14 point type (font size), because it is easier to read and have plentyof white space.
* Write only what is needed and avoid the use of special jargons.
* Use flow diagrams and check whenever possible.

# Give the ISO 9001 requirements?

* + Scope
	+ Normative Reference
	+ Terms and Definitions
	+ Quality Management System
	+ Management Responsibility
	+ Resource Management
	+ Product Realization
	+ Measurement, Analysis & Improvement

# Define Quality Audits. (Dec 2017) (Apr/May 2018) (Apr/May 2019), (June/July 2021).

Quality Audits examine the elements of a quality management system in orderto evaluate how well these elements comply with quality system requirements.

# What are the qualities of a good auditor?

* Good in written and oral communication
* A good listener
* Able to focus on the task at hand should not get disturbed by other activitiesthat are taking place at the same time.
* Able to identify the vital facts from the ocean of information
* Honest and impartial.

# Give the objectives of Internal Audit.

* Check whether the actual performance conforms to the documented QMS.
* Start corrective action to eliminate the cause of non- conformities.
* Follow up on non- conforming items from previous audits.
* Provides continued improvement in the system.
* Cause the auditee to think about the process, and encouraging possible improvements.

# List the features of internal audit.

* The quality audit typically applies to quality systems or elements such as processes, products or services. Such audits are often called “ quality system audits” , “ process quality audits”,” product quality audits” and “service quality audits” respectively.
* Quality audits are carried by staff who are not directly responsible in the areas being audited. But preferably auditors should work in cooperation with relevant personnel.
* Quality audit is an information gathering activity. It is not a police kind of activity.
* Quality audit may be conducted for internal or external purposes. They need not cover whole quality system, at once, but may cover elements of it.

# What are the types of audit? (DEC’13, May 2017, June/July 2021).

**First Party Audit (Internal audit):** This refers to an internal audit where the auditeeis its own client that is audit is done by an organization, working on itself.

**Second party audit:** This refers to audit by one organization on another organization (auditee). This type of audit is normally done on a supplier by a customer.

**Third party Audit:** This refers to audit by an independent organization on a supplier,for accreditation assessment purposes.

# What are the four stages of an audit?

* + Audit Planning
	+ Audit Performance
* Audit Reporting
* Audit Follow up

# What are the methods of actual audit?

* + 1. Examination of documents, 2. Observation of activities, 3. Interviews

# What is QS 9000?

* QS 9000 is a set of quality system requirements recently adopted by members of the automotive industry.
* QS 9000 was proposed by Chrysler, Ford and General Motors in 1994.
* QS 9000 is harmonization of Chrysler’s supplier Quality Assurance Manual, Ford’s Q-101 Quality System standard and General Motor’s NAO Targets for Excellence.
* QS 9000 focuses on helping automotive suppliers to ensure that they aremeeting/exceeding automotive customer requirements.
* QS 9000 is now being replaced by a newer related standard called ISO/TS 16949. TS 16949 contain all of ISO 9000, QS 9000 and many Europeanstandards**.**

# What is the objective of QS 9000?

To develop fundamental quality systems based on continuous improvement, direct

prevention, reduction of variation and waste elimination in the automobiles supply chain.

# List the applications of QS 9000.

QS 9000 can be applied to all internal and external suppliers of:

Production materials, Production or service parts, and Heat treating, painting, plating or finishing services.

# What are the contents of QS 9000?

Section I: ISO 9000 Based Requirements

Section II: Automotive Sector Specific RequirementsSection III: Customer Specific Requirements

# What are the documents required for QS 9000? (May 2017)

Section I: ISO 9000 based requirements

Section II: Automotive sector specific requirementsSection II: Customer specific requirements

* + QS 9000 quality system requirements
	+ Advanced Product Quality Planning (APQP)and Control Plan
	+ Failure Mode and Effects Analysis (FMEA)
	+ Measurement system analysis
	+ Fundamental statistical process control
	+ Production Part Approval Process (PPAP) manual and
	+ Quality System Assessment (QSA) manual.

# What is ISO 14000? Why do we need ISO 14000 standards?

The ISO 14000 is a set of norms for Environmental Management system (EMS)either at organization and process level or product level.

* The ISO 14000 standard brings a world- wide focus to the environment, encouraging cleaner, safer, healthier world for all. The existence of the standards allows organizations to focus environmental efforts against internationally accepted criteria.
* Nowadays, companies require environmental management certification to compete in the global marketplace. So the ISO 14000 registration may become the primary requirement for doing business in many regions or industries.

# List the ISO 14000 series of standards.

Two areas:

* + Organization evaluation standards
	+ Product evaluation standards

# What are the purposes of series of ISO 14000 standards?

The series of ISO 14000 standards are designed to cover:

* + Environmental management systems,
	+ Environmental auditing,
	+ Environmental performance evaluation
	+ Life cycle assessment and
	+ Environmental aspects in product standards.

# What are the requirements of ISO 14001?

General requirements

* + Environmental policy
	+ Planning
	+ Implementation and operation
	+ Checking and corrective action
	+ Management review

# What are the benefits of ISO 14000?

1. Global
	* Facilitate trade and remove trade barriers
	* Improve environmental performance of planet earth
	* Build consensus that there is a need for environment managementand a common terminology for EMS.
2. Organizational
	* Assuring customers of a commitment to environmental management
	* Meeting customer requirements
	* Maintaining a good public / community relations image
	* Satisfying investor criteria and improving access to capital
	* Obtaining insurance at reasonable cost
	* Increasing market share that results from a competitive advantage
	* Reducing incidents that result in liability
	* Improving defense posture in litigation
	* Conserving input materials and energy
	* Facilitating the attainment of permits and authorization
	* Improving industry/government relations

# What are the four elements for the checking & corrective action of ISO 14001?

* Monitoring and measuring
* Nonconformance and corrective and preventative action
* Records
* EMS audit

# What are the seven elements for the implementation & operations of ISO 14001?

a) Structure and responsibility, b) Training, awareness and competency c) Communication,

d) EMS documentation e) Documentation control f) Operational control g) Emergency preparedness and response.

# What are the four elements for the planning of ISO 14001? (May 2016) (Apr/May 2019)

* + Environmental aspects
	+ Legal and other requirements
	+ Objectives and targets
	+ Environmental Management Programs

# Give the types of Organizational Evaluation Standards?

Environmental Management System Environmental Auditing Environmental Performance Evaluation

* 1. **Give the types of Product Evaluation Standards?** Environmental Aspects in Product StandardsEnvironmental Labeling Life-Cycle Assessment

# List some organization which has ISO standard.

Neda Telecommunications, district passport office- Delhi, ComputerMaintenance corporation, Infosys.

* 1. **Differentiate the terms environmental aspects and environmental impact. Environmental aspect:** is defined as an element of an organisation’s activities, or services that can interact with the environment. Examples are waste water discharges, air emissions, and energy usage.

**Environmental impact:** is defined as any change, whether adverse or beneficial, wholly or partially resulting from an organisation’s activities, products, or services. Examples are impact on water supply and soil erosion.

* 1. **Contrast environmental objective and environmental target. Environmental objective:** is an overall environmental goal, arising from the policy statement, that an organisation sets for itself.

**Environmental target:** is a detailed performance requirement and should bequantifies when practical.

# What is the purpose of EMS audit?

The purpose of EMS audit is to ensure that the EMS conforms to plans.

# Where we can apply the ISO 9000 series of standards?

ISO 9000 series of standards are applied to any organization , large or small, whether its

product, whether it is a business enterprise, a public administration or a government department.

# What is meant by environmental policy?

* The environmental policy should address the following issues:
* Management commitment to continual improvement
* Prevention of pollution
* Compliance with environmental laws and regulation, cooperation with publicauthorities
* Creating a framework for setting objectives

# What is meant by environmental policy?

* The environmental policy should address the following issues:
* Management commitment to continual improvement
* Prevention of pollution
* Compliance with environmental laws and regulation, cooperation with publicauthorities
* Creating a framework for setting objectives

# What is the concept of environment management system?(May/June 2013)

1.Environmental policy

2. Planning

Continual improvement

4. checking and corrective action

3 Implementation and operation

5.Management review

# What is meant by environmental policy?

* The environmental policy should address the following issues:
* Management commitment to continual improvement
* Prevention of pollution
* Compliance with environmental laws and regulation, cooperation with publicauthorities
* Creating a framework for setting objectives

# What are the organization standard and products standard? (May/June 2013)

**Organization standard**

1. Environmental Management system,
2. Environmental Auditing (EA) and
3. Environmental Performance Evaluation (EPE)

# Product standard

1. Environmental Aspects in product Standards(EAPS),
2. Environmental Labels and Declaration(ELD),and
3. Life Cycle Assessment(LCA)

# What is general requirement of quality management system?(Nov/Dec 2011)

* To achive, maintain and seek to continuously improve product/service quality.
* To improve the quality operation to continually meet customers and stakeholderand implied needs.
* To provide confidence to internal management and other employees that quality requirements are being fulfilled and that improvement is taking place.

# Differentiate between ISO 9000 and QS 9000.(Nov/Dec 2012)

**ISO 9000** has become an international reference for quality management requirements are being achieved in the delivered product.

**QS 9000** is set of quality system requirements to help automotive suppliers to ensurethat they are meeting/exceeding customer requirement.

# What are the benefits of ISO-9000 certification? (NOV’13 ,May 2016)

* + It forms a solid foundation for improvement, consistency, and profitability.
	+ It provides good platform for continuous quality improvement.
	+ It provides a status symbol for the organization and acts as powerful marketing tool.
	+ It increases the potential market share.
	+ It increases awareness of employee in company requirements and activities.
	+ It ensures customer satisfaction.
	+ It improve documentation, operating standards, and housekeeping.

# What are the objectives of ISO 9000?

* Customer Focus: Understand customer needs, meet customer requirements, andstrive to exceed customer expectations.
* Leadership: Establish unity of purpose and organizational direction.
* Involvement of people: Use abilities of employees for the benefit of theorganization.
* Process approach: Things accomplished are the results of processes and processesand resources must be managed.
* System approach to management: Multiple processes contribute to system andshould be managed as a system.
* Continual improvement: Of people, processes, systems and products.
* Factual approach to decision making: Decisions must be based on the analysis ofaccurate, relevant, and reliable data and information.
* Mutually beneficial supplier relationships: Both the organization and the supplierbenefiting from each other’s resources and knowledge results in value for all.

# Compare QS 9000 with TS 16949 quality system

* Both are related to automotive quality system standards, now QS 9000 is beingreplaced by ISO /TS 16949 standards.
* QS 9000 is basically product approach whereas TS 16949 is a processapproach.
* The other difference between QS 9000 and ISO/TS 16949 relate to the aspectsof customer satisfaction and employee motivation
* TS 16949 is much less focus on documentation and more focus on how thesystem is performing in achieving customer satisfaction

# What are the core elements of QMS?

1. [Quality policy](https://en.wikipedia.org/wiki/Quality_policy)
2. Quality objectives
3. Quality manual
4. [Organizational structure](https://en.wikipedia.org/wiki/Organizational_structure) and responsibilities
5. [Data Management](https://en.wikipedia.org/wiki/Data_Management)
6. Processes - including purchasing
7. Product quality leading to [Customer satisfaction](https://en.wikipedia.org/wiki/Customer_satisfaction)
8. [Continuous improvement](https://en.wikipedia.org/wiki/Continuous_improvement) including [corrective and preventive action](https://en.wikipedia.org/wiki/Corrective_and_preventive_action)
9. Quality instruments
10. [Control of Document](http://www.qi-a.com/Quality-Management-Systems-Software/Document-Control.aspx)

# Name any two generic ISO standards. Why it is called generic standards?

 ISO 9000  ISO 14000

1. **What does it mean to be AS9100 certified?**

**AS9100 Certification Definition**. AS9100 is a company level certification based on a standard published by the Society of Automotive Engineers (SAE) titled "Quality Systems- Aerospace Model for Quality Assurance in Design, Development, Production, Installation and Servicing".

1. **What is the difference between ISO 9001 and AS9100?**

Using ISO 9001:2015 helps ensure that customers get consistent, good quality products and services, which in turn brings many business benefits. AS9100 is the international management system standard for the Aircraft, Space and Defense (AS&D) industry.

1. **Why is AS9100 important?**

The Importance of AS9100 Certification, AS9100 is the international quality management system (QMS) standard for the aerospace industry, providing suppliers with a system to ensure they produce safe and reliable products according to civilian and military aviation requirements.

1. **Define TL 9000.**

TL 9000 is a quality management practice designed by the QuEST Forum in 1998. It was created to focus on [supply chain](https://en.wikipedia.org/wiki/Supply_chain) directives throughout the international [telecommunications industry,](https://en.wikipedia.org/wiki/Telecommunications_industry) including the USA.

# Write the significance of quality auditing. (Nov/Dec 2018)

Quality audit covers various aspects of quality activities within the organisation. It covers auditing the; policies and procedures of the companies regarding operation, quality control and management activity. It also covers the system and the operating effectiveness which cover various activities such as : product design changes, tool and gauge control, storage and handling practices, assessment of product quality, interdepartmental coordination, equipment control, record and corrective action.

# Mention the elements of ISO 14000. (Nov/Dec 2018)

* Environmental Policy
* Planning
* Implementation and Operation
* Checking and Corrective action

**PART B (C404.5)**

1. Explain the various elements of ISO 9000 in detail. **(Nov/Dec 2012) (May/June 2013)(Nov/Dec 2013) (Dec 2017), (June/July 2021).**
2. Explain the following

Implementation of ISO 9000(steps for registration)

Documentation of ISO 9000 (OR) Describe the four tiers of Quality Documentation.

# (Apr/May 2018)

1. Explain in detail about the quality auditing with its types and also give the various stages of an audit**. (Nov/Dec 2011) (May 2017).**
2. Explain various requirements of ISO 14000. **(May 2016) (May 2017) (Dec 2017), June/July 2021. (OR)** Give a brief note (Concepts & Benefits) on EMS ISO 14000 model **(Nov/Dec2011)(Nov/Dec 2013) (May 2017) (Apr/May 2018) (Nov/Dec 2018)**
3. Discuss in detail about the QS 9000 **(May/June 2013) (NOV/DEC 2013)**

Explain the need for ISO 9000 and other quality system. **(Nov/Dec 2018)**

1. What methodology would you suggest to implement TQM in an automobile manufacturing company? **(Nov/Dec 2012) (Apr/May 2018)**
2. Discuss the implementation of TQM with a case study from the manufacturing industry.

# (Nov/Dec 2011) (Apr/May 2019) (June/July 2021)

1. Explain about the various processes used in ISO 9001 quality management system**(Nov 2016)**
2. Discuss the Importance of ISO 9000. **(Apr/May 2019)**
3. Discuss the implementation of AS 9100.