Topic and Contents	Hours	Marks
7.1. Meaning of quality • Definition of quality • Concept of quality • Quality management • Quality management system • Quality control • Quality circle • Quality assurance 7.2. Meaning of total quality and TQM • Concept of TQM • Components of TQM • Elements of the TQM • Benefits of TQM 7.3. Modern techniques of TQM • Kaizen • Five 'S' • Six Sigma 7.4.ISO 9001:2000 • Concept • Main clauses • Benefits	**06**	**08**

Q. What do you mean by quality?

Definitions of quality:

1. Quality is the fitness for purpose.
2. Quality is about satisfying the needs of the customer and doing so, at an economic cost.
3. Quality is defined by the customer.
4. Quality is the degree of congruence between expectation and realisation.
5. Quality is giving the customer, what he wants today at a price he is pleased to pay, at a cost we can contain, again and again and again, and giving him something even better tomorrow.
6. Quality is satisfaction and loyalty of customer.
7. Quality is conformance to specifications.
8. Quality is predictable degree of uniformity.
9. Quality is the totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs.

Q. Explain concept of quality.

1. Quality is not a mathematical statistics.
2. Quality is invisible when it is good, impossible to ignore when it is bad.
3. Quality is a familiar word in all fields.
4. Quality satisfies expectations of customers and understands their needs and further requirements.
5. Quality is not negotiable.
6. Quality increases productivity.
7. Quality means improved business performance.
8. The cost of non-quality is high.

Q. what is quality management?

Definition: It is a technique which ensures quality in the industrial operations. It is a comprehensive way to achieve fitness for purpose and satisfying customer needs. Systems for improving and managing quality have evolved rapidly in the recent years.

For a level in the evolution of quality management

- Inspection: It is just the function consisting of checking and inspecting the product.
- Quality control: It controls the quality of manufacturing items. Wastage is less.
- Quality assurance: It ensures the quality. It strongly plays to keep the product quality in a systematic way.
- Total quality management: Quality aspect is given the highest priority. Efforts are taken in totality.

Quality management principles:

1. Customer focus
2. Leadership
3. Involvement of people
4. Process approach
5. System approach to management
6. Continuous improvement
7. Mutual beneficial supplier relationships.

Quality management when separately studied can be classified as per following procedure.

1. Plan
2. do
3. check
4. Act

1. Plan:
    a. The quality concept and objectives
    b. Statutory considerations of quality
    c. Product liability for quality
    d. Product safety
    e. Training for quality
    f. Documentation and records schematically.

2. Do:
    a. Procurement as per norms.
    b. Just-in-time supplies.
    c. Process capability carefully.
    d. Product reliability neatly.
    e. Material handling effectively.
    f. Documentation and records schematically.
3. Check:
    a. Statistics.
    b. Control charts.
    c. Inspection.
    d. Quality audits.
4. Act:
    a. Managing non-conformity.
    b. Improvement continuously.
    c. TQM.
    d. Cultural and organisational aspects.

Advantages of quality management:

1. Assures quality.
2. Improves productivity.
3. Customer's satisfaction.
4. Wastages reduced.
5. Better approach to work.
6. Effective systems of working.
7. All are involved.
8. Continuous improvement.
9. Overall growth.

Q. What is quality management system (QMS)?

The impact of ISO 9000 certification on performance is a popular one. However, still there is necessity of rigorous performance improvement and cost reduction. The process to produce and effective QMS requires following:

1. The analysis of the standard requirements.

2. The scheme's introduction.
3. The top management's responsiveness.
4. The clear presentation of quality policies.
5. The aggressive implementation of QMS.

The standard has integrated Basic 8 quality management principles

1. Customer focus.
2. Leadership.
3. Involvement of people.
4. Process approach.
5. System approach.
6. Continual improvement.
7. Factual approach to decision-making.
8. Mutually beneficial supplier relationships.

The characteristics of a QMS in regard to quality include following:

1. The establishment of policy and objectives by an organisation to manage resources.
2. The assignment of responsibilities and authority to personnel.
3. The development of an organisational structure among the personnel.

Activities of QMS

Following are the QMS activities:

1. Design.
2. Build.
3. Control.
4. Deployment.
5. Measurement.
6. Review.
7. Improvement

Design and build: design of QMS must be done by senior managers to suit the needs of organisations. Goals of the organisation should be taken into consideration. The core processes of the organisation should be at the centre point. Interests of all stakeholders in other words, overall achievements

should be linked properly in designing and building QMS. During all this phase, quality function plays an important role.

Deployment and implementation: This is best achieved using process packages, where each core process is broken down into sub-processes. It is properly described by documentation, education and training.

Control: It depends on the size and complexity of the organisation. Local control and central controls both are used. Local controls are quick and effective. All the higher authorities are considered in control activity. All control sub-activities are documented for further reference.

Measurement: it is carried out to determine the effectiveness and efficiency of each process. This includes the contribution of the QMS to the organisation's goals.

Following are measured:

- Deployment
- Business coverage
- Speed of change
- Usage
- Staff

Q. What are the benefits of QMS?

1. Increase the efficiency.
2. Increased revenue.
3. Better employee morale.
4. Recognition in globe.
5. Logical decision-making.
6. Supplier relationships improvement.
7. Perfection in documentation.
8. Process consistency.
9. Customer satisfaction.
10. Process improvements.
11. Improved growth rate.
12. Reduction in mistakes.
13. Improved products.

Q. Explain quality control.

Meaning:

- Quality control is a part of quality management focused on quality requirements.
- Quality control gives more attention on testing of products to find defects and reporting to management before release of product.
- Following are few techniques of quality control
    1. statistical quality control
    2. total quality control
    3. companywide quality control

Q. What are the objectives of quality control?

Quality control has following objectives:

1. To decide the quality standard:

Quality control is playing an important role in deciding the standard of quality of a product. This is in reference with easy acceptance of the product to the customer. So such parameters must be known to quality control department. It is not suggested to finalise the quality standards when standards are not acceptable by the customer. This quality standard should be economical to maintain.

Hence quality standards should be

- related to performance
- customer acceptance
- economically feasible

2. To check the quality deviations:

Many times due to problems in manufacturing, the quality of products is not as per the standard. Hence, objective of quality control is to find such reasons and to take the corrective steps to reduce the deviations in quality.

3. To restrict the non-quality products:

The quality control has objective to restrict those products from going up to customer which are not as per the quality.

4. To improve the quality:

Quality control has two take actions so that the standard of quality could be improved. Quality control has to take such initiatives.

Q. Give functions of quality control.

1. Restriction: products which have quality are only dispatched for the customer. Products which have less quality are not allowed to enter into market. Serious attention for quality is given for restricting non-quality items.
2. Methods: correct methods are required for quality output. Appropriate methods are suggested to have control on quality of manufacturing.
3. Rejection: defective and faulty products are rejected. No excuse for non-quality items.
4. Investigation: all the efforts are taken to investigate problems which affect quality standards. This gives reasons of poor quality. Further mistakes can be avoided due to this investigation.
5. Rehabilitation: the rejected items are rectified. Efforts are made to do rehabilitation of these items.

Q. What are the advantages of quality control?

By performing functions under quality control, we observe following benefits:

1. Improvement in quality of product.
2. Reputation creation in market.
3. Customer gets satisfied.
4. Rejection products are very less.
5. Increased sale of products.
6. Uniformity in quality.
7. Improved working processes.
8. Less wastage.
9. No complaints from customers.
10. Repeat customer increases.
11. More customer retention.
12. More mouth-to-mouth publicity.

13. Improvement in design aspects.
14. Less inspection cost.
15. Cost of manufacturing gets reduced.
16. It is mandatory to improve quality levels of the work.
17. Suppliers have to improve their quality.
18. No quality issues once they are delivered.
19. Product reliability increases.
20. Quality control helps to sort out the defects.

Q. Explain concept of quality circle.

1. Quality circles are the most wide spread form of employee involvement teams.
2. Quality circle is defined as a small group of employees, usually 5 to 10 people, doing similar or related work to meet regularly to identify, analyse and solve product quality and production problems and to improve general operations.
3. Focus is primarily on quality, cost, specifications, Waste control, schedules and productivity.
4. Quality circle is a problem solving technique.
5. It is a form of participative management.
6. Quality circle is a human resource development technique.
7. It assumes that, the suggestions related to the workplace should come from those who work those who have domain knowledge and those who have experience.
8. The people closest to the problem understand it better.
9. Quality Circle members meet voluntarily.
10. Quality circles are usually considered to be the brainchild of Dr. Koaru Ishikawa.
11. Few cross sectional problems are also considered in quality circle discussions, but generally it is more concerned with similar work areas related issues.
12. It believes that group of working members may come up with an correct solution that a single separate member.

Q. What are the characteristics of quality circles?

1. Voluntary participation of the members.
2. Solution oriented approach.
3. Recognition to individual in the organisation due to his/her involvement.
4. Work background is shared without ego.
5. Meetings have agendas and minutes.
6. It is not hierarchical. All are on the same platform.
7. It is supported by top management also.
8. Involvement of operational management team also.
9. Rotating chairmanship for meetings.
10. Training is provided to leaders and members.
11. Quality circles built mutual trust and create greater understanding between the management and the workers.
12. Employees get chance to use their wisdom and creativity.
13. Involvement as a member in quality circle, improves leadership qualities. This also promotes self development and attitude of teamwork is cultured.
14. Many chronic problems, difficult situations, challenges can be solved with the support of quality circles in the organisation.

Q. What are the aims of quality circles?

- To improve and develop the enterprise.
- To solve problems in work.
- To maintain and improve quality.
- To share information in group.
- To stretch human potential and capabilities.
- To respect human relations.
- To build job satisfaction.
- To involve them in bottleneck problems and solve the problems.
- To improve the productivity.
- To reduce the cost of products.
- To do waste reduction.

- To promote effective utilisation of resources.
- To be careful in avoiding unnecessary errors and defects.
- To tap the creative intelligence people.
- To ensure full use of human resources.
- To improve communication within the organisation.
- To build a positive and meaningful work environment.
- To satisfy the human needs of recognition and achievement.

Q. Give the requirements of quality circles.

1. Quality circle should consist only of volunteers.
2. The members of the circle should all be from different functional areas.
3. The problem to be studied should be chosen by the team and not to impose by the management.
4. Management must wholeheartedly support the circle.
5. Members of the circle should be trained.
6. The leader of the circle and the internal management of the circle should be decided by the members.
7. Management should provide a middle manager as mentor to the circle.

Q. Explain that structure of the quality circle.

There are five elements in an organisational structure of a quality circle:

1. Steering committee
2. Coordinators
3. Facilitator
4. Circle leader
5. Circle members

1. Steering committee:

- It is at the top of the structure of quality circle.
- Any of the higher authorities heads it.
- It has members from the top management.
- HRD personnel are also there.
- Employee's union member may be included.

2. **Co-ordinators:**
    - Role is to help in case of difficulties.
    - Facility arrangements of interdepartmental communication are done by co-ordinators.
    - They are from administrative office or HR department.
3. **Facilitator:**
    - Facilitator is from senior supervisory category.
    - Role is to keep circle on track.
    - One facilitator handles up to 10 circles at a time.
4. **Circle leader:**
    - He is from the lowest level of supervisors.
    - He/she conducts circle activities.
5. **Circle member:**
    - There are workers.
    - They attend the meetings of quality circle.
    - Members give suggestions.
    - They participate in circle discussions.

Q. Which efforts have to take to improve effectiveness of quality circles in industries?

1. Awareness should be created among all.
2. Grooming of all for better initiative.
3. Freedom of expression.
4. Involvement of management enthusiastically.
5. Improving faith in quality circles.
6. Feedback must be informed to all, about previous meetings.
7. Awards to those who are effectively working in quality circles.
8. Support from employees for the success of quality circles.
9. Homework by all members about the next meeting.
10. Providing correct information to all.

Q. How will the quality circle improve quality of organisation?

- Quality potential and capabilities of employees is tapped.
- Individual of organisation gets involved in results and output.
- Instead of gossiping, suggestions are given to organisational work.
- Walls between cadres get dissolved to form a family like atmosphere.
- Each individual of the organisation cares the organisation.
- Quality of work execution increases.
- Organisation shows quality improvements in interpersonal relations.
- Teamwork leads into development in both quantity and quality.
- Quality information is being shared to get quality products.
- Culture of organisation gets improved.
- Decision-making of the organisation becomes more correct.

Q. Explain the concept of quality assurance.

- It is a prevention-based system which improves product and service quality.
- It improves productivity by placing the emphasis on product, service and process design.
- It concentrates on source activities. It integrates quality into the planning and design stage.
- It stops non-conforming product being produced or non-conforming services being delivered in the first place.
- Even when defects occur they are identified in the early process.
- QA is a proactive approach.
- There is clearly defined feedback loop with both negative and positive feedback into the process product or service system.
- Quality is created in the design stage and not at the later control stage.
- There is recognition of the process.
- It also brings a clearer and deeper sense of responsibility for quality.
- It eliminates the root cause of waste.
- It requires various departments' improvement.
- It ensures quality due to system efforts.

- It is a wider concept that covers all policies and systematic activities implemented within a quality system.
- Quality assurance framework:
    1. Determination of adequate technical requirements of inputs and outputs.
    2. Certification and rating of suppliers stop
    3. Testing of procured material for its conformance to established quality, performance, safety and reliability standards.
    4. Proper receipts, storage and issue of material.
    5. Audit the process quality.
    6. Evaluation of the process to establish required corrective response.
    7. Audit of the final output for conformance to
        - Technical
        - Reliability
        - Maintainability
        - Performance requirements.

Q. Explain quality assurance system.

Following facts are considered while developing quality assurance system:

1. Designing manufacturing procedures.
2. Defining quality aspects.
3. Formatting the quality control plan.
4. Deciding about percentage checking.
5. Finalisation of norms for the quality for the plant performance.
6. Formatting procedures to have quality performance.
7. Feedback system.
8. Rejection analysis.
9. Corrective actions provisions.
10. A manual for quality assurance.
11. Planning for quality improvement.
12. Planning for motivation for quality.
13. Planning awareness about quality.

Q. Explain total quality and TQM.

1. Total quality management is the mutual cooperation of everyone in an organisation and associated business process to produce value for money products and services which meet and hopefully exceed the needs and expectations of customers.
2. It involves the application of quality management principles to all aspects of the organisation, including customers and suppliers and all business elements.
3. Total quality management requires that the principles of quality management should be applied in every branch and at every level in the organisation.
4. It is a companywide approach to quality, with improvements undertaken on a continuous basis by everyone in the organisation.
5. The spread of TQM philosophy would also be expected to be accompanied by greater sophistication in application of tools and techniques, increased emphasis on people, process management, improved training and greater efforts to eliminate wastage.
6. TQM also extends beyond the organisation to include partnerships with suppliers and customers.
7. TQM is both philosophy and a set of guiding principles for managing an organisation to the benefits of stakeholder.
8. TQM cares customer requirements.
9. The word total is used because it is concerned with everything the company does.
10. This total indicates that all members of the organisation make consistent efforts to achieve the objectives of customer's satisfaction through systematic ways.
11. Product, process, system, people and leadership form the five pillars of TQM.
12. TQM leads to continuous improvement in an organisation.
13. TQM involves everything and everyone.

14. TQM is a necessity. It is a journey that never ends. It is a way to survive and succeed.
15. TQM has helped people, organisations and nations to attain superiority, prosperity and international prominence.
16. TQM is centered on quality so as to result in customer delight.
17. Fundamental concepts behind TQM:
    a. Satisfied customer base must be retained.
    b. Customer satisfaction through identification of needs of customer.
    c. Producing necessary output at a minimum cost.
18. TQM is not an overnight cure for an organisation's quality problems.
19. Our TQM implementation process is not like a program.
20. TQM implementation efforts have a beginning, but if implemented properly, it does not have an ending.
21. TQM emerged almost 50 years ago in Japan and America, largely as the result of pioneering work by Deming, Juran and others.
22. TQM emphasises a number of management concepts, all centered on philosophies of customer focus, continuous improvement, defect prevention and a recognition that responsibility for quality is shared by all of us.
23. Implementing a TQM culture takes years, and returns on the TQM investment will not be instantaneous.

Q. Which are the components of TQM?

Components of TQM are:

1. Continuous improvement
2. Customer focus
3. Zero defects
4. Training and development
5. Total employee involvements
6. Long-term commitment
7. Leadership

1. continuous improvement:
    - There is no limit to continuous improvement.
    - This is beneficial in improving quality standards.
    - Under TQM, there is continuous improvement in processes, products, work culture, services etc.
    - This pattern of continuous improvement explorers good things from the organisation.
    - This makes organisation competent and updated.
2. Customer focus:
    - Customer is the centre point under TQM.
    - Various factors are taken to run the organisation with focus at a customer.
    - Customer moods, needs and requirements are understood through market research.
    - Customers are classified into internal customers and external customers. Employees of the organisation are internal customers and outside stakeholders are external customers.
    - All customers are carefully handled by providing suitable services. Customer care system is designed to make the customer happy.
    - Services provided to customers are of high standard and this is maintained all the time.
3. Zero defects:
    - Product/service should be perfect. This is seriously considered in TQM.
    - Under TQM efforts are made to reduce the defects to zero.
    - Zero defects give excellence in product/service.
    - Systems are designed throughout the organisation for zero defects.
4. Training and development:
    - TQM cannot be implemented in one shot.

- For effective implementation of TQM, employees are given training.

5. Total employee involvements:
    - All the employees from top to bottom are included in TQM implementation.
    - TQM can be weak if even a section of the organisation is not involved in the process.
    - All are informed about the importance of TQM individually or as an organisation.
6. Long-term commitment:
    - TQM is not an event.
    - It is not a periodic activity.
    - It is a path for continuous growth.
    - Hence for success in TQM, there is expectation of long-term commitment.
7. Leadership:
    - TQM needs consistent and disciplined leadership.
    - It is teamwork, but this team can only work when there is someone who gives direction.
    - At each level also, such leadership is expected from department heads or centre heads.
    - Leadership keeps TQM in track in the respective organisation.

Q. What are the elements of TQM/principles?

Following are the elements of total quality management:

1. satisfaction of customers
2. employees morale
3. quality control
4. quality planning
5. quality improvement
6. quality assurance
7. production control

8. quality in procurement
9. vendor control
10. customer relationship management (CRM)
11. strategic quality management
12. lower cost
13. higher revenue
14. quality control circles
15. teamwork
16. Value improvement
17. quality improvement

Q. What are the benefits of TQM?

1. Due to implementation of TQM, status of the organisation becomes competent.
2. Improvement in productivity.
3. Higher profitability.
4. Satisfaction of customer is achievable.
5. Customer retention is achieved.
6. Position in market becomes strong.
7. Loyalty of customer increases.
8. Increased adaptability of organisation to changes outside.
9. Costs are reduced.
10. Reduction of defects.
11. Elimination of waste.
12. Job security increases.
13. Improvement morale of employees.
14. Value of stakeholder is enhanced.
15. Improvement in human resource.

Q. Which are the modern techniques and systems of quality management?

1. **KAIZEN:**

Concept of kaizen:

1. Kaizen is the Japanese term which means improvement.
2. Kaizen means slow, never-ending improvement in all aspects of life.
3. Kaizen is a continuous series of small step improvements made on existing system.
4. It does not expect heavy investments.

5. An important expect of kaizen is the standardisation and maintenance of improvements.
6. Improvements must become standardised and maintained until further improvement is made.
7. Kaizen is most effective when used in combination with innovative type improvements.
8. By practicing kaizen culture, managers demonstrate commitment to quality. Also, workers, with adequate support from managers, become a major source of improvement.

Criteria	Kaizen	Innovation
Involvement	collective, everybody	individual, few
Effect	Long-term	Short-term
Effort orientation	People	Technology
Speed	Small steps	Big steps
Change	Gradual and constant	Abrupt and volatile

9. In the initial stages of implementing kaizen, any organisation is likely to face problems. But it should be developed in such a way that it then becomes a group activity.
10. There is structured approach to kaizen improvements.
11. It is important to follow each and every step.
    a. Defined area of improvement.
    b. Analyse and select appropriate problem.
    c. Identify causes.
    d. Plan countermeasures.
    e. Implementation.
    f. Confirmation of result.
    g. Standardisation.
12. Kaizen approach stresses the importance of standardising improvements.
13. Kaizen is applicable to all levels in an organisation, both an individual and a team.
14. The foundation of the kaizen method consists of five founding elements.
    - Teamwork.
    - Personal discipline.
    - Improved morale.
    - Quality circles.
    - Suggestions for improvement.

Q. How to achieve continuous process improvement?

1. Process improvements can be brought by:
   a. Breakthrough thinking- the big step changes in methods and thinking.
   b. Process stabilization-bringing process under control.
   c. Incremental improvement-step by step improvements at continuous flow by small increments.
2. It is the process of incremental, systematic, gradual, orderly and continuous improvement that uses the best of all techniques, tools, systems and concepts.
3. The aim of kaizen is to ensure that everyone in an organisation is of the frame of mind to pursue continuous improvement naturally in whatever they do.
4. Kaizen also encourages people to accept continuing change at the place where action takes place.

Japanese techniques: Japanese management techniques are famous worldwide. Concepts and philosophies like just-in-time, kaizen, total quality management, Poka yoke, six Sigma, 5'S' are surprisingly accepted by all and appreciated everywhere. The contribution of Japan in this aspect is really invaluable and that's why Indian companies are also implementing the same to improve their overall business growth.

Q. Which are the principles of kaizen?

1. Maintain a positive attitude.
2. Look for solutions rather than accepting excuses.
3. Everybody can contribute and everybody's contribution can be valuable.
4. Take action! Just do it!
5. Do it now. Don't wait for perfection. Whatever you do now, will achieve something.
6. Continuous focus on improvement.

7. Delighting the customer.
8. Everything should be considered from a total system standpoint.

Q. Which are the key elements of kaizen?

1. Adaptability of both people and equipment.
2. Use of existing technology to optimize capacity.
3. Creative involvement of all employees.
4. "Make it a little better each day" is the attitude.

Q. How an organisation is involved in Kaizen?

1. Top management:
   - Kaizen is as a corporate strategy.
   - Provide support by allocating resources.
   - Establish policy for kaizen and cross functional goals.
   - Realise kaizen goals through audits.
   - Build systems suitable for kaizen.
2. Middle management:
   - Implement kaizen goals as directed by the top management.
   - Use kaizen in functional capabilities.
   - Establish, maintain and upgrade standards.
   - Make employees kaizen conscious through training.
   - Help employees to develop their skills for problem-solving.
3. Supervisors:
   - Use kaizen in functional areas.
   - Provide guidance to workers.
   - Improve communication with workers.
   - Support small group activities.
   - Introduce discipline in the workshop.
4. Workers:
   - Engage in kaizen.
   - Practice discipline in the workshop.
   - Engage in continuous self development.
   - Enhance skills.
   - Improve jobs performance.

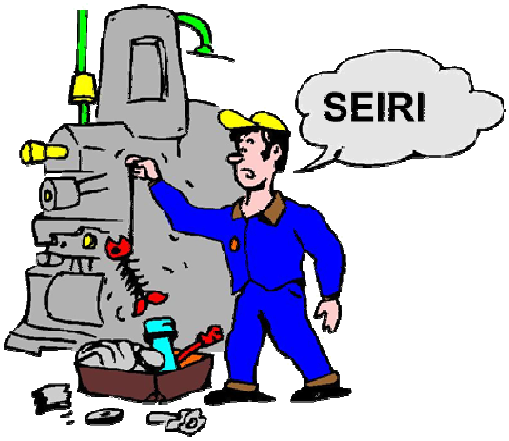
2. FIVE 'S'

5 S is a methodology for organising and minimising items within a workplace, in order to make it operate more efficiently. The phases are:

1. Sort
2. Simplify
3. Shine
4. Standardise
5. Sustain

Meaning and implementation:

1. Sorting (Seiri):
    - Things which are unwanted are removed off. Needed items are kept up and organised in proper way. Remaining items are stored.
    - Do survey of all items.
    - Eliminate those which are not required.



    - Group those which are required.
    - Arrange them as per requirement.
    - Do priority wise positioning of items.
    - Here, items covered are tools, materials, spares, equipment etc.
2. stabilising/simplify (Seiton):
    - It is also called as set in order. Here, the things that are the tools, equipment and parts are arranged in a manner that

promotes workflow. Means they are kept at the places where they will be used. Due to this designation of item at location, efficiency of process is maximised.

- It is also called as straightening out.
- It is the process of simplifying the flow of materials.
- Items are placed in defined positions and labeled by the appropriate name.
- Place is created for all required items.
- All items are placed in a specified position.
- Due to this there is efficient flow of material.
- Due to this access becomes easier.

3. Sweeping (Seiso):

- It is nothing but a regular cleaning and maintenance of the items. Things are kept in a neat manner. At the end of each shift, the work area is cleaned up and everything is restored to

its place. The key point is that maintaining cleanliness should be part of the daily work.

- It is also called as shining.
- Cleaning of workplace is done.
- All equipment are cleaned.
- Things are kept clean and tidy.
- Everything is restored to its place properly.
- This creates discipline in housekeeping.
- If there is any leakage it can be easily detected.
- Any breakage is also noticed immediately.
- Neatness and cleaning is the motto of seiso.

4. Standardising (Seiketsu):
   - Everyone doing the things in the same way. Work practices and operations are standardise and consistent. Buried in work is possible due to standardised working nature of all.
   - Everything at a workplace must be standard one.
   - Set up at workplace is defined and properly designed.

   - Tools, equipments, processes and accessories are standardised.
   - All are given same instructions.
   - Responsibilities are also standardised.

5. Sustain (Shitsuke):
   - It is maintaining what has been decided. Efforts are taken to integrate and implement all phases in the daily activities.

- Follow the standard way of working.
- Don't go away from it.
- For improvement, if necessary, suggest few ways to the system.

Q. Give the advantages of 5 'S'.

1. A systematic way of working.
2. Good housekeeping.
3. Disciplined positioning of items.
4. Improved profitability.
5. Availability of item whenever desired.
6. It is a method for organising a workplace, especially a shared workplace.
7. As everything is assigned at a proper location, time is not wasted in searching the things.
8. It guides us about
   - What should be kept?
   - Where it should be kept?
   - How it should be stored?
9. There is elimination of waste non-required items from workplace.
10. Items/things are placed in organised manner.
11. Worker's confusion reduces.
12. Extra movements are reduced.
13. Problems related to breakage, wear are detected immediately.

14. Productivity of work gets improved.
15. Heavy maintenance in future is avoided.
16. There is quality improvement.
17. Psychological impact is positive. Fresh atmosphere.
18. Probability of accidents is reduced.

3. SIX SIGMA:

1. Definition: it is a business process that allows companies to drastically improve their bottom line, by designing and monitoring everyday business activities to minimize waste and resources while increasing customer satisfaction.
2. Why the name 6 Sigma?

Sigma is a statistical unit of measurement expressed as 'σ'. It describes the distribution about the mean of any process or procedure. A process that can achieve plus or minus 6 Sigma capability can be expected to have a defect rate of no more than a few parts per million. It allows the curve, to shift the right and which causes shift in the mean. In statistical terms, this approaches zero defects.

3. Six Sigma process has ±6 standard deviation distance from the process mean to each product specification limit.
4. Implementation of six Sigma gives guidelines to reduce or eliminate the mistakes.
5. It provides specific methods to recreate the process so that detects and errors never arise in future.
6. Six Sigma Forces businesses to go away with the bad habits.
7. It produces superior financial results when implemented in an organisation.
8. Six Sigma tells us-
    - We don't know what we do know.
    - We can't do what we don't know.
    - We won't know until we measure.

- We don't measure what we don't value.
- We don't value what we don't measure.

9. Six areas of improvement:
    - process improvements
    - product and service improvements
    - investor relations
    - design methodology
    - supplier improvement
    - training and recruitment
10. Six Sigma is applicable in almost all areas of work.

The Six Sigma Road Map			
	Stage	**B.S. phase**	**Objective**
Break-through strategy (B.S.)	Identification	Recognise Define	Identify key business issues
	Characterisation	Measure Analyse	Understand current performance levels
	Optimisation	Improve Control	Achieve breakthrough improvement
	Institutionalisation	Standardise Integrate	Transform how day to day business is conducted

The six Sigma breakthrough strategies is a delivery vehicle for achieving excellence through:

1. Committed leadership.
2. Integration with top-level strategy.
3. A cadre of change agents-Black belts.
4. Customer and market focus.

5. Bottom-line impact.
6. Business process focus.
7. Obsession with measurement.
8. Continuous innovation.
9. Organisational learning.
10. Continuous reinforcement.

11. Six Sigma success factors are:
    1. Leader's commitment to 6 Sigma.
    2. Common language to be used throughout the organisation.
    3. Aggressive goals for improvement.
    4. Innovative ideas.
    5. Fact-based decision-making.
12. Six Sigma initiative steps include the following:
    1. Perform financial analysis to understand profitability.
    2. Established profitability objectives.
    3. Measure contributors to profitability.
    4. Establish business objectives.
    5. Recruit people for a training Six Sigma.
    6. Define projects.
    7. Develop plans for improvement.
    8. Conduct training.
    9. Develop solutions to reduce waste.
    10. Monitor the progress.
13. Improvement in productivity due to 6 Sigma:
    1. Productivity= output/input

To improve productivity, there are three ways:

1. Reduce input.
2. Increase output.
3. Increase input marginally and increase output heavily.

2. Following are the points which clearly say that there is improvement in productivity due to 6 Sigma:

a. Business activities are monitored and rectified every day.
b. Plans are made to minimise the Waste.
c. Actions are taken to eliminate defects and reach to zero defects stage. This is nothing but reducing input.
d. Methodology of error free techniques is implemented.
e. Output is improved by giving training.
f. Six Sigma does integration with top-level management.

3. Thus input of time, money, extra material is reduced.
4. Output in terms quality, quantity and services is increased.
5. Investments are done in such a way that people become trained for a higher level technology.

Q. Explain ISO 9001:2000.

The standard demands a documented QMS. Within this mandated documentation are to be found the means to do the following:

1. Identify QMS processes.
2. Determined process sequence and interaction.
3. Determine operational and monitoring criteria.
4. Determine operational and monitoring methods.
5. Monitor processes.
6. Measure processes.
7. Analyse processes.
8. Achieve planned results.
9. Achieve continual improvement of processes.

Documents required for ISO 9001:2000

1. Corporate manuals.
2. Divisional manuals.
3. Process manuals.
4. Fact books.
5. Purchasing manuals.
6. Training manuals.
7. Design history files.
8. Master manuals

Main clauses:

Main clauses of ISO 9001:2000 are:

1. Management responsibility.
2. Resource management.
3. Product realisation.
4. Measurement, analysis and improvement.

1. Management responsibility:

Committed management is must:

(a) Management commitment:

- Quality policy should be established.
- All the internal stakeholders of the organisation must be communicated about the plan.
- Establish quality objectives very carefully.
- Management reviews must be taken care.
- Resources availability must be taken care.

(b) Customer focus:

- It is the responsibility of management to determine the customer requirements and plan the ways to satisfy customers.
- Top management should ensure that the organisation is taking efforts as per the mood of customer and meeting the requirements of customers.

(c) Quality policy:

- Management should define the organisation's quality policy.

- They should review the policy, to ensure that it is still suitable.

(d) Quality planning:

- Management should ensure that quality objectives are set for all functional areas.
- Object use must be measurable.
- These objectives should be set at all levels of the organisation.

(e) Management representative:

- There should be a appointment of management representative to oversee QMS implementation.
- This representative should report on the status of the QMS.
- He should support in the improvements in QMS.

2. Resource management:

- Human, infrastructure, work environment, etc. are resources apart from machine and material.
- There should be identification of resources which are needed for the quality system.
- Provision of quality systems resources must be done.
- Resources should be made available in such a way that, finally the customer is satisfied.

Human resources

- Education, training, skill and experience are the prerequisites of human resource.
- Acceptable level of competence must be defined.
- Identify the training needs.
- Keep the record of competence.

Infrastructure

- Identify needs for building:
    - workspace
    - hardware
    - utility
    - equipment
- Provide and maintain the infrastructure.

3. Product realisation:

(a) Planning:

- The organisation should determine the quality objectives and requirements of the product.
- As per the product requirements, there should be preparation of documentation, processes finalisation and provision of resources.
- Inspection and test activities specific to the product should be decided.

(b) Customer related processes:

- Identify customer's product requirements.
- Review customer's requirements.
- There should be proper arrangements of informing about product to customer, customer feedback, complaints etc.

(c) Purchasing:

- Ensure the purchased products meet the requirements.
- Verify purchased products at supplier's premises and on the receipt in the organisation.

(d) Production and service provision:

- Be sure that instructions are available.
- Equipment used must be suitable.
- Implementation of monitoring and measurement.
- Do validation of production and service provisions.
- Use specific methods and procedures.
- Control of monitoring and measuring devices.

4. Measurement, analysis and improvement:

- Plan how remedial processes such as monitoring measurement, analysis and improvement will be used to improve the system.
- Monitor and measure customer satisfaction.
- Identify ways to do such monitoring.
- Use customer satisfaction information.
- Set up an internal audit program.

- Perform internal audits regularly.
- Take corrective actions.
- Verify that product characteristics are being met.

Q. What are the benefits of ISO 9001:2000?

1. Processes become consistent and repeatable.
2. Quality is constantly measured.
3. The reduction in defect rates.
4. Assurance of corrective actions at the time of defect.
5. Early detection of defects.
6. Correction of defects at lower cost.
7. New employees find easiness to understand the processes, as they are documented properly.
8. Obsolete and inefficient practices are eliminated.

Helpful lines for online exam

1. Quality is fitness for
    a. **purpose**
    b. action
    c. product
    d. business
2. quality is defined by

a. manager
b. engineer
c. QC in charge
d. **customer**

3. Statement 1-quality is visible when it is good

   Statement 2-it is possible to ignore it, when quality is bad

   a. both one and two correct
   b. **both one and two wrong**
   c. one correct, two wrong
   d. one wrong, to correct

4. Which statement is wrong?

   a. **Quality is negotiable**
   b. quality increases productivity
   c. quality is defined by the customer
   d. the cost of non-quality is high

5. QA is

   a. quality administration
   b. quality affiliation
   c. **quality assurance**
   d. quality action

6. match the pairs

a. Inspection	1. Effects are taken in totality
b. Quality control	2. It ensures quality
c. quality assurance	3.checking of product
d. TQM	4. It controls the quality

   a. a-2,b-4,c-3,d-1
   b. a-3,b-1,c-4,d-2
   c. **a-3,b-4,c-2,d-1**
   d. a-2,b-1,c-3,d-4

7. **Customer focus, continuous improvement and process approach** are the principles of quality management.

8. In quality management, PDCA means?
    a. **Plan, do, check, act**
    b. process, do, committee, act
    c. plan, do, committee, approach
    d. none
9. Quality management
    a. **assures quality**
    b. only few do all work
    c. both (a) and (b) are correct
    d. both (a) and(b) are wrong
10. The process to produce an effective QMS requires
    a. top management's support
    b. aggressive implementation of quality policy
    c. clear presentation of quality policy
    d. **all**
11. QMS means
    a. **quality management system**
    b. quality measurement system
    c. quality of measured standards
    d. none
12. objective of quality control is
    a. to decide the quality standard
    b. to check the quality deviations
    c. **both are correct**
    d. both are wrong
13. quality standards should be related to
    a. performance
    b. acceptance
    c. economically feasibility
    d. **all**

14. Which is a function of quality control?
    a. Restricting non-quality products
    b. rejecting faulty products
    c. both are wrong
    d. **both are correct**
15. Statement 1-quality circle is a problem-solving technique
    Statement 2-quality circle is responsibility of management
    a. both 1 and 2 are correct
    b. both 1 and 2 are wrong
    c. **1 correct, 2 wrong**
    d. 1 wrong, 2 correct
16. Quality circle is a brainchild of **Ishikawa.**
17. Which statement is wrong?
    a. Meeting of quality circle have no agendas
    b. it is a hierarchical
    c. training is not necessary in quality circles
    d. **all**
18. Which is the element of quality circle?
    a. Steering committee
    b. Circle leader
    c. Circle member
    d. **all**
19. Which element is at the top of the quality circle?
    a. **Steering committee**
    b. Circle leader
    c. Circle member
    d. facilitator
20. Circle leader is from **workers.**
21. Statement 1-quality assurance is a proactive approach
    Statement 2-quality assurance improves quality of product
    a. **Both 1 and 2 correct**

b. both 1 and 2 wrong

c. 1 correct,2 wrong

d. 1 wrong,2 correct

22. Quality assurance is a **proactive** approach.

23. Which is the component of TQM?

a. Continuous improvement

b. customer focus

c. total involvement of all employees

d. **all**

24. Which is the element of TQM?

a. Employees morale

b. quality assurance

c. quality control

d. **all**

25. Kaizen means **improvement.**

26. Slow, never-ending, continuous improvement in all aspects of life is **kaizen.**

27. Which statement about kaizen is wrong?

a. **It needs heavy investment**

b. it gives commitment to quality

c. it is a Japanese technique

d. it is a continuous improvement

28. Innovation shows **big** steps and kaizen shows **small** steps in speed of work.

29. Effect of innovation is **short term** and effect of kaizen is **long-term.**

30. Involvement in innovation is of **individual** and in kaizen is **everybody.**

31. The foundation of kaizen, consists of---

a. quality circles

b. teamwork

c. **both (a) and (b)**

d. none

32. Which is not included in 5 'S'?

a. Sort

b. **solve**

c. Shine

d. sustain

33. match the pairs

a. Seiri	1. Standardise
b. Seiton	2. Sanitise
c. Seiso	3. Systemise
d. Seiketsu	4. Structurise

a. a-1,b-3,c-4,d-2

b. a-2,b-1,c-3,d-4

c. a-3,b-2,c-1,d-4

d. **a-4,b-3,c-2,d-1**

34. throw away unnecessary is in

a. **Seiri**

b. Seiton

c. Seiso

d. Seiketsu

35. neatness is included in

a. Seiri

b. Seiton

c. **Seiso**

d. Seiketsu

36. discipline comes in

a. Seiri

b. Seiso

c. **Shitsuke**

d. Seiketsu

37. sweeping means

a. **Seiso**

b. Seiri

c. Seiketsu

d. Shitsuke

38. sustain means
    a. **Shitsuke**
    b. Seiri
    c. Seiso
    d. Seiketsu
39. 5S is **systematic way of working, good housekeeping and disciplined positioning of items.**
40. Six Sigma success factors are **leader's commitment, innovative ideas and fact-based decision-making.**
41. Which is not the stage in six Sigma?
    a. Optimisation
    b. identification
    c. characterisation
    d. **standardisation**
42. Which is the main clause in ISO 9001:2000?
    a. Management responsibility
    b. product realisation
    c. resource management
    d. **all**
43. quality management is not focusing on
    a. **money**
    b. quality
    c. productivity
    d. improvements