

TOTAL QUALITY MANAGEMENT

2 MARK QUESTIONS & ANSWERS

Unit I

1. Define quality.

Quality is the totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs. - ISO

2. List the dimensions of quality.

1. Performance,
2. Features,
3. Conformance
4. Reliability,
5. Durability
6. Service,
7. Response,
8. Aesthetics and
9. Reputation.

3. What do you mean by quality planning?

It is a strategic planning process in which quality is embedded in each and every step.

4. Where we use the quality planning road map?

The quality planning road map can be applied at the following levels:

1. Supervisory and worker level,
2. Functional level,
3. Multifunctional systems, and
4. Major programmes.

5. Define quality costs?

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.

6. List the categories of quality costs.

1. Cost of prevention,
2. Cost of appraisal,
3. Cost of internal failures, and
4. Cost of external failures.

7. What is meant by cost of prevention?

Prevention costs are the costs that are incurred on preventing a quality problem from arising.

8. List the elements of cost of prevention.

Cost of prevention includes:

- (i) cost of quality planning,
- (ii) cost of documenting;
- (iii) Process control cost;
- (iv) cost of training;



- (v) Costs associated with preventing recurring defects, *etc.*

9. What is cost of appraisal?

Appraisal costs are the costs that are incurred in assessing that the products / services conform to the requirements.

10. What are the costs of appraisal?

Cost of appraisal includes:

1. Cost of receiving test and equipment;
2. Cost of laboratory acceptance testing;
3. Cost of installation testing;
4. Cost of installation and commissioning;
5. Cost of maintenance and calibration of testing and inspecting equipments.

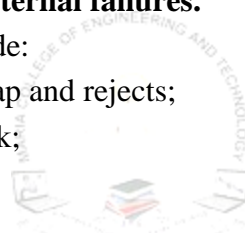
11. What is meant by cost of internal failures?

The costs associated with defective products, components and materials that fail to meet quality requirements and result in manufacturing losses are called as costs of internal failures. These costs are linked to correcting mistakes before delivery of the product.

12. List the components of cost of internal failures.

Costs of internal failures include:

1. Cost associated with scrap and rejects;
2. Cost of repair and rework;
3. Cost of design changes;
4. Cost of trouble shooting;
5. Cost of re-inspection and retesting; *etc.*



13. What is meant by cost of external failures?

It consists of the costs which are generated because of defective products being shipped to customers. These costs are associated with the adjustments of malfunctions after delivery of the product.

14. What are the elements of cost of external failure?

Cost of external failures includes:

1. Cost of processing complaints from customers;
2. Cost of commissioning failures;
3. Cost of servicing or replacing the defective items;
4. Cost of guarantee and warranty claims;
5. Cost of lost goodwill of customers; *etc.*

15. What are the techniques commonly used for analyzing the quality costs?

The techniques used for analyzing the quality costs are:

1. Trend analysis, and
2. Pareto analysis.

16. Define TQM.

Total Quality Management is the management approach of an organisation, 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 organisation and to society - ISO.

17. What are the six basic concepts that a successful TQM programme require?

1. Top management commitment,
2. Focus on the customer,
3. Effective employee involvement,
4. Continuous improvement,
5. Treating suppliers as partners, and
6. Establishing performance measures.

18. What are the elements of TQM?

Three elements of TQM include:

1. **The philosophical element:** It includes leadership, continuous improvement, employee participation and development, design quality and prevention, partnership development, etc.
2. **The generic tools:** These include SPC tools, QFD, new seven management tools, and FMEA.
3. **QC department:** It consists of SQC methods, benchmarking, Taguchi methods, and TPM.

19. What are the pillars of TQM?

The four pillars of TQM are:

1. Problem solving discipline;
2. Interpersonal skills;
3. Teamwork; and
4. Quality improvement process.

20. List out any four barriers to TQM implementation.

1. Lack of management commitment.
2. Lack of employees' commitment.
3. Lack of effective communication.
4. Lack of continuous training and education.

Sixteen mark questions

- 1. Explain the fourteen principles of Deming?**
- 2. Explain the barriers for implementing TQM?**
- 3. Explain on Juran's ten steps to quality improvement.**
- 4. Explain fourteen points for quality?**
- 5. What are the different definitions given for quality? Explain how it got evolved and what are its prime concerns.**
- 6. Explain the basic concepts of TQM?**
- 7. Elucidate the TQM framework and awareness.**
- 8. Explain Juran's 'Quality Trilogy' in detail.**



Unit II

1. What do you mean by the term leadership?

Leadership is the process of influencing the activities of an individual or a group towards the achievement of a goal in a given situation.

2. List out the different leadership roles required for effective teamwork.

The eight leadership roles are:

1. Producer role,
2. Director role,
3. Coordinator role,
4. Checker role,
5. Stimulator role,
6. Mentor role,
7. Innovator roles, and
8. Negotiator role.

3. What is a quality council? Who are all the members in the quality council?

❖ *A quality council* is a team to provide overall direction for achieving the total quality culture.

❖ *The members of quality council are:*

- (i) The chief executive officer (CEO),
- (ii) The senior managers of the different functional areas, and
- (iii) A coordinator or consultant.

4. What is vision statement?

The vision statement is a short declaration of what an organization aspires to be tomorrow.

5. What is mission statement?

It is a broad organizational goal, based on planning premises, which justifies an organization's existence.

6. What is quality policy statement?

The quality policy is a guide for everyone in the organization as to how they should provide products and service to the customers.

7. What is strategic planning?

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

8. What are the steps involved in strategic planning process?

The strategic planning process involves seven basic steps. They are:

1. Customer needs,
2. Customer

3. Predict the future,
4. Gap analysis,
5. Closing the gap,
6. Alignment, and
7. Implementation.

9. Who are internal and external customers?

The customers inside the company are called internal customers, whereas the customers outside the company are called external customers.

10. What are the customer's perceptions on quality?

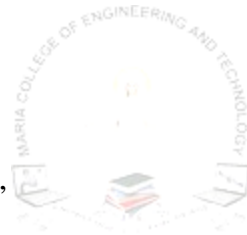
The six important customer's perceptions are:

1. Performance,
2. Features,
3. Service,
4. Warranty,
5. Price, and
6. Reputation.

11. List the various tools used for collecting customer complaints.

The various tools used are:

1. Comment card;
2. Customer questionnaire;
3. Focus groups;
4. Toll-free telephone numbers,
5. Report cards;
6. The internet and computer, etc.



12. What is meant by customer retention?

Customer retention is the process of retaining the existing customers.

13. What is motivation?

Motivation means a process of stimulating people to accomplish desired goals.

14. What are the Maslow's basic needs?

Maslow's basic needs are:

1. Physiological,
2. Safety,
3. Social,
4. Esteem, and
5. Self-actualization needs.

15. What are physiological needs?

Physiological needs are the biological needs required to preserve human life. These needs

include needs for food, clothing and shelter.

16. List the Herzberg's motivators and dissatisfiers.

Motivator factors	Dissatisfier or hygiene factors
<ul style="list-style-type: none">▪ Achievement▪ Recognition▪ The work itself▪ Responsibility▪ Advancement and growth	<ul style="list-style-type: none">▪ Supervisors▪ Working conditions▪ Interpersonal relationships▪ Pay and security▪ Company policy and administration

17. Define empowerment.

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

18. What are the conditions necessary for empowerment?

The conditions required are:

1. Everyone must understand the need for change.
2. The system needs to change to the new paradigm.
3. The organization must provide information, education, and skill to its employees.

19. Define team and teamwork.

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

20. List the different types of teams.

1. Process improvement team,
2. Cross-functional team,
3. Natural work team, and
4. Self-directed work team.

21. Name different members in a team?

1. Team leader,
2. Facilitator,
3. Recorder,
4. Timekeeper, and
5. Members.

22. What are the stages of team development?

The six stages of team development are:

1. Forming stage,
2. Storming stage,
3. Norming stage,
4. Performing stage,
5. Maintenance stage, and
6. Evaluating stage.

23. What is meant by recognition in an organisation ?

Recognition is a process whereby management shows acknowledgement of an employee's outstanding performance.

24. Classify rewards.

- **Intrinsic rewards:** These are related to feelings of accomplishment or self-worth.
- **Extrinsic rewards:** These are related to pay or compensation issues.

25. What is performance appraisal?

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

26. List four common barriers to team progress.

1. Insufficient training,
2. Incompatible rewards and compensation,
3. Lack of planning, and
4. Lack of management support.

27. List various techniques to sustain continuous improvement.

1. Juran trilogy,
2. PDSA cycle,
3. 5S concept, and
4. Kaizen.

28. What are the three elements of Juran trilogy?

1. Quality planning,
2. Quality control, and
3. Quality improvement.

29. What is PDSA cycle?

The PDSA stands for Plan, Do, Study, and Act. It is a model for testing ideas that you think may create improvement.

30. What is '5W2H' method?

The 5W2H stands for what, why, where, when, who, how, and how much. It is also a continuous improvement tool.

31. What is 5S practice?

The 5S practice is a housekeeping technique used to establish and maintain a productive and quality environment in an organisation. 5S stands for SEIRI, SEITON, SEISO, SEIKETSU, and SHITSUKE.

32. Differentiate SEIRI and SEITON.

- *SEIRI* denotes action to identify and sort out all items into necessary and unnecessary items and discard all unnecessary items .
- *SEITON* means to arrange everything in proper order so that it can be easily picked up for use.

33. What does SEIKETSU mean?

SEIKETSU means maintaining high standards of workplace organisation and housekeeping at all times

34. What is Kaizen?

Kaizen is a Japanese word which means continuous improvement or improvement over improvement. It is the process of continuous improvements in small increments that make the process more efficient, effective, controllable, and adequate.

35. Different Kaizen and Kairyo.

Kaizen	Kairyo (Innovation)
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<ul style="list-style-type: none"> • It is achieved through conventional know-how and PDCA. • It is employee oriented. • It requires little investment but great effort to maintain. • It involves everybody in the company. • It requires recognition of effort before results. 	<ul style="list-style-type: none"> • It is obtained by technological or organizational breakthrough. • It is technology oriented. • It requires large investment but little effort to maintain. • It involves a selected few experts and researchers. • It is motivated by expected results.
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36. What does the term 'Muda' refer?

Muda refers to the seven classes of wastes. They are over-production, delay, transportation, processing, inventory, wasted motion, and defective parts.

37. Define partnering.

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.

38. List the various elements to achieve partnering.

- Long-term commitment
- Trust, and
- Shared visions.



39. What are the types of sourcing?

1. Sole sourcing,
2. Multiple sourcing, and
3. Single sourcing.

40. Differentiate between sole sourcing and single sourcing.

Sole sourcing is the use of only one supplier for the organisation, whereas single sourcing is the use of one supplier for an item when several sources are available.

41. What are the various stages in supplier selection and evaluation?

The four stages in supplier selection and evaluation are:

1. Survey stage,
2. Enquiry stage,
3. Negotiation and selection stage, and
4. Experience stage.

42. What is supplier rating?

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

43. Why does customer rate supplier?

The customer rates supplier in order to :

- obtain an overall rating of supplier performance;
- ensure complete communication with supplier;
- provide each supplier about the details of problems for corrective action; and
- Maintain and improve the partnering relationship.

44. What does the term relationship development refer?

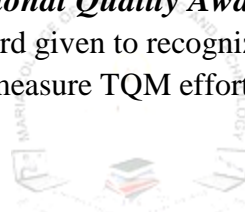
The relationship development refers to maintaining and improving the growth of the customer-supplier relationship.

45. What are the techniques commonly used for performance measures presentation?

- | | |
|------------------------------|-----------------------------|
| 1. Time series trend graph, | 2. Control charts, |
| 3. Capability index, | 4. Taguchi's loss function, |
| 5. Cost of poor quality, and | 6. Quality awards. |

46. What is Malcolm Bal ridge National Quality Award (MBNQA)?

The MBNQA is an annual award given to recognize U.S. organizations for performance excellence. This award is used to measure TQM efforts on an annual basis.



Sixteen mark questions

9. What should a leader know and understand in order to be effective?
10. Explain Deming Wheel (PDSA cycle)?
11. What are the major benefits of 5S implementation? Explain how are they achieved?
12. Describe the various Quality statements. Give example.
13. What are the seven steps to strategic planning?
14. Explain the following
 - a. 5 s
 - b. kaizen
 - c. supplier rating and relationship development.
7. Discuss about Maslow's need hierarchy theory and Herzberg's two factor theory for motivation.
8. What are the techniques commonly used for performance measures?

Unit III

1. List the seven tools of quality.

1. Check sheets,
2. Histograms,
3. Cause and effect diagrams,
4. Pareto diagrams,
5. Stratification analysis,
6. Scatter diagrams, and
7. Control charts.

2. What is check sheet?

A check sheet or tally sheet is a form for systematic data gathering and registering to get a clear view of the facts.

3. When do you use the check sheet?

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

4. What are the types of check sheets commonly used?

1. Process distribution check sheet,
2. Defective item check sheet,
3. Defect location check sheet, and
4. Defect factor check sheet.

5. What is histogram?

A histogram is a bar chart / diagram showing a distribution of variable quantities or characteristics. It is graphical display of the frequency distribution of numerical data.

6. When do you use histogram?

- A histogram is used to show clearly where the most frequently occurring values are located and the data is distributed.
- It enables the analyst to quickly visualize the features of a complete set of data.

7. What are the various types of histogram?

1. Bell-shaped,
2. Double-peaked,

3. Plateau,
4. Comb,
5. Skewed
6. Truncated,
7. Isolated peak, and
8. Edged peak.

8. What is cause and effect diagram?

The cause and effect diagram or Fishbone diagram is a graphical-tabular chart to list and analyze the potential causes of a given problem.

9. Under what situations, one can use cause and effect diagram?

The cause and effect diagram has unlimited application in research manufacturing, marketing, office operations, services, *etc.*

10. What are the uses of CE diagram?

The cause and effect diagrams are used:

- To analyze cause and effect relationships
- To facilitate the search for solutions of related problems.
- To standardize existing and proposed operations, and
- To educate and train personnel in decision-making and corrective action activities.

11. What is 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.

12. State the Pareto principle.

Pareto principle states that a few of the defects accounts for most of the effects ...

13. What are the purposes of Pareto diagrams?

- Pareto analysis can be used in a wide range of situations, where one need to priorities problems based on its relative importance.
- It can be used as a risk assessment technique from activity level to system level.

14. What is stratification?

Stratification is a method of analysis of data by grouping it in different ways.

15. What is scatter diagram?

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

16. When do you use the scatter diagram?

- The purpose of the scatter diagram is to display what happens to one variable when another variable is changed.

- This diagram is used to understand why particular variations occur and how they can be controlled.

17. What is control chart?

A control chart is a graph that displays data taken over time and the variation of this data.

18. What are the types of control charts?

1. *Control charts for variables* - for measurable data such as time, length, temperature, weight, pressure, *etc.*
2. *Control charts for characteristics* - for quantifiable data such as number of defects, typing errors in a report, *etc.*

19. When do you use 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.

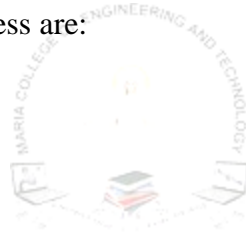
20. What is Six Sigma?

Six sigma is similar to Zero Defects (ZD), is a philosophical benchmark or standard of excellence proposed by Philip Crosby. Six sigma strives for perfection. It allows for only 3.4 defects per million opportunities (or 99.99966 percent accuracy).

21. What are the five phases in six sigma process?

The five phases in six sigma process are:

1. Define,
2. Measure,
3. Analyse,
4. Improve, and
5. Control.



22. Brief the scope of six sigma principle.

The six sigma concept is originated from manufacturing field. Now it is applied to non-manufacturing processes also. Today one can apply six sigma to many fields such as services, medical and insurance procedures, call centers, *etc.*

23. List out the new seven management tools.

1. Affinity diagram,
2. Relationship diagram,
3. Tree diagram,
4. Matrix diagram,
5. Decision tree (PDPC),
6. Arrow diagram, and
7. Matrix data analysis diagram.

24. What is affinity diagram?

An affinity diagram is a tool to collect a large amount of verbal expressions (ideas, opinions, observations, *etc.*) and organize them in groups according to natural relationships between individual items.

25. When do we use affinity diagram?

Affinity diagram is used:

- 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 those are not clear.
- To create new concepts.

26. What is relationship diagram?

The relationship diagram is a tool for finding causes to a problem. The relationship diagram not only clarifies the relationship between cause and effect but also between the various causes.

27. When do we use relationship diagram?

The purpose of the relationship diagram is to generate a visual representation of the relations between an effect and its causes as well as the inter-relationship between the different causes of the problem.

28. What is 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.

29. When do we use tree diagram?

The purpose of the 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.

30. What is matrix diagram?

A matrix diagram is a tool that is used to systematically organize information that must be compared on a variety of characteristics in order to make a comparison, selection or choice.

31. When do we use matrix diagram?

The matrix diagram is used to show relations between individual items in two sets of factors.

32. What is decision tree or process decision programme chart (PDPC)?

A decision tree or pope is a planning tool to outline every conceivable and likely occurrence in any planning.

33. When do we use decision tree?

- The pope or decision tree 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.

34. What is arrow diagram?

An arrow diagram is a graphical description of the sequential steps that must be completed

before a project can be completed. Example: PERT and CPM charts.

35. When do we use arrow diagram?

- The main purpose of the arrow diagrams are:
 - (i) To show the paths to complete a project.
 - (ii) To find the shortest time possible for the project, and
 - (iii) To display graphically simultaneous activities.
- The arrow diagram is indispensable for long-term projects, such as the construction of a plant or the development of new products.

36. What is 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.

37. When do we use matrix data analysis diagram?

The purpose of matrix data analysis diagram is to present numerical data about two sets of factors in a matrix form and analyse it to get numerical output. This tool is used in principal component analysis where only two characteristics can be studied at a time.

38. In what way, matrix data analysis diagram differs from all other management tools?

Matrix data analysis diagram is the only tool among the 'new seven management tools' which uses numerical data and produces numerical results.

39. What is benchmarking?

Benchmarking is the process of identifying, understanding, and adapting, outstanding practices and processes from organizations anywhere in the world to an organisation to improve its performance.

40. What are the objectives for benchmarking?

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

41. What are the different types of benchmarking in relation to objects being benchmarked?

1. Product benchmarking,
2. Performance benchmarking,
3. Process benchmarking, and
4. Strategic benchmarking.

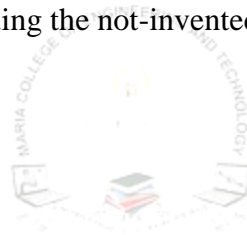
42. Classify benchmarking based on the nature of firms against which benchmarking could be done?

1. Internal benchmarking,
2. Industry benchmarking,
3. Competitive benchmarking,
4. Best-in-class benchmarking, and
5. Relationship benchmarking.

43. List out any four benefits of benchmarking.

The benefits of competitive benchmarking include:

1. Creating a culture that values continuous improvement to achieve excellence.
2. Sharing the best practices between benchmarking partners.
3. Prioritizing the areas that need improvement.
4. Enhancing creativity by devaluing the not-invented - here syndrome.



Sixteen mark questions

1. Explain the detail about the 7 SPC tools of quality.
2. Explain the term “process capability”.
3. Discuss in detail about the concept of Six-Sigma.
4. List out the new 7 management tools and explain each one.
5. Discuss briefly the various tools of statistical fundamentals.
6. Explain the QC or SPC tools?
7. Explain the Seven Management Tools?
8. Plot the control chart for variables and attributes
9. Explain the concepts of Six Sigma?

10. Explain the different steps involved in FMEA with an examples.
11. Problems in control charts and process capability.

Unit IV

1. What is QFD?

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

2. What are the objectives of QFD?

The objectives of QFD are:

1. To identify the true voice of the customer and to use this knowledge to develop products which satisfy customers.
2. To help in the organisation and analysis of all the pertinent information associated with the project.

3. What do you mean by House of Quality?

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 resemble connected houses.

4. What are the six sections of a basic house of quality matrix?

The six sections of a basic house of quality matrix are:

1. Customer requirements,
2. Prioritized customer requirements,
3. Technical descriptors,
4. Relationship matrix,
5. Trade-off matrix, and
6. Prioritized technical descriptors.

5. What are the four phases of product development in QFD process?

1. Product planning,
2. Part development,
3. Process planning, and
4. Production Planning.

6. List out any four benefits of QFD.

QFD is a communication and planning tool that:

1. Promote better understanding of customer demands.
2. Improves customer satisfaction.
3. Promotes team work.
4. Facilitates better understanding of design interactions.

7. What are Taguchi methods?

- Taguchi methods are statistical methods developed largely by Genichi Taguchi to improve the quality of manufactured goods.
- Taguchi's principle contributions to statistics are:
 1. Taguchi loss function
 2. The philosophy of off-line quality control, and.
 3. Innovations in the design of experiments.

8. Define quality in terms of Taguchi's words.

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

9. Write down the philosophy of quality loss function.

The loss function philosophy says that for a manufacturer, the best strategy is to produce products as close to the target as possible, rather than aiming at "being within specifications".

9. State the concept of quality loss function.

The essence of the quality loss function (QLF) concept is that whenever a product deviates from its target performance, it generates a loss to society. This loss is minimal when performance is right on target, but it grows gradually as one deviates from the target.

10. 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.

11. What are the types of maintenance?

The four types of maintenance are:

1. Corrective or break down maintenance,
2. Scheduled or Routine maintenance,
3. Preventive maintenance, and
4. Predictive maintenance.

12. What do you mean by the term corrective or breakdown maintenance?

Corrective maintenance implies that repairs are made after the failure of machine or equipment.

13. Explain the term scheduled or routine 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.

14. What do you mean by 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 breakdowns and interruptions in production.

15. What do you mean by the term predictive maintenance?

In predictive technique, on the prediction of any fault, maintenance is being done. 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.

16. What is TPM?

TPM is the systematic execution of maintenance by all employees through small group activities. The dual goals of TPM are zero breakdowns and zero defects.

17. What are the objectives of TPM?

The objectives of TPM are:

1. To improve equipment effectiveness.
2. To achieve autonomous maintenance.
3. To plan maintenance.
4. To train all staff in relevant maintenance skills.
5. To achieve early equipment management.

18. What are the six big losses?

The six big losses are:

1. Breakdowns,
2. Setup and changeover,
3. Idling and minor stoppages,
4. Reduced speed,
5. Defects and rework, and
6. Start up losses.

19. What is the concept of 'true' TPM?

The concept of 'true' TPM is that everyone from the operator to top management is responsible for maintenance activities.

20. What is the formula for calculating overall equipment effectiveness (OEE)?

Overall equipment effectiveness (OEE) = *Availability* x *Performance efficiency* x *Rate of quality products*.

21. What do you mean by the term Terotechnology?

TPM's comprehensive role in integration of interrelated activities has been described as Terotechnology. Terotechnology is concerned with the application of managerial, financial, engineering and other skills to extend the operational life and increase the efficiency of equipment and machinery.

22. What is FMEA?

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

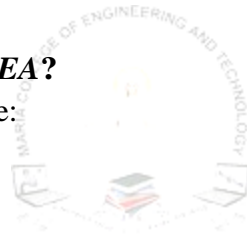
23. State the objective of FMEA.

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

24. What are the various types of FMEA?

The various types of FMEA are:

1. System FMEA,
2. Design FMEA,
3. Process FMEA,
4. Service FMEA,
5. Equipment FMEA,
6. Maintenance FMEA,
7. Concept FMEA, and
8. Environmental FMEA.



25. List out any four benefits of FMEA.

Benefits of FMEA include:

- Improved product / process reliability and quality
- Increased customer satisfaction.
- Early identification and elimination of potential product / process failure modes.
- Prioritized product / process deficiencies.

26. What are the inputs for preparation of FMEA?

1. People inputs, and
2. Data inputs.

27. List the four stages of FMEA.

1. Specifying possibilities,
2. Quantifying risk,
3. Correcting high risk causes, and
4. Re-evaluation of risk.

28. Differentiate the terms Failure Mode and Failure Effects.

- A *failure mode* is defined as the manner in which a component, subsystem, system, process, etc., could potentially fail to meet the design purpose.
- A *failure effect* is defined as the result of a failure mode on the function of the product / process as perceived by the customer.

29. Define risk priority number (RPN). Also state its significance.

- The Risk Priority Number (RPN) is defined as the product of the severity (S), occurrence (O), and detection (D) rankings. That is, $RPN = (S) \times (O) \times (D)$.
- The RPN is used to priorities items that require additional quality planning or action.

Sixteen mark questions

1. Explain QFD with a suitable example. What are its advantages and Limitations?
2. Write short notes on:
 - (a) Taguchi's Quality Loss Function
 - (b) TPM
3. Explain quality costs. What are the barriers for implementing TQM in an industry? Explain.
4. What are the six major loss areas need to be measured for implementing TPM?
5. Discuss the QFD process with new chart and flow diagram.

Unit V

1. Give the ISO 9000 Series of Standards?

1. ISO 9000, "Quality Management and Quality Assurance Standards Guidelines for Selection and Use".
2. ISO 9001, "Quality Systems – Model for Quality Assurance in Design, Development, Production, Installation & Servicing".
3. ISO 9002, "Quality Systems – "Model for Quality Assurance in Production, Installation & Servicing".

4. ISO 9003, “Quality Systems – “Model for Quality Assurance in Final Inspection and Test”.
5. ISO 9004-1, “Quality Management and Quality System Elements – Guidelines”.

2. 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.

3. Give some other quality systems?

The quality systems are

1. QS-9000
2. QS-9000
3. TE-9000
4. AS9000

4. Enumerate the steps necessary to implement the Quality Management System?

The steps necessary to implement the Quality Management System are

1. Senior management commitment
2. Appoint the management representative
3. Awareness
4. Appoint an implementation team
5. Training
6. Time schedule
7. Select element owners
8. Review the present system
9. Write the documents
10. Install the new system
11. Internal audit
12. Management review
13. Pre assessment
14. Registration.

5. What are the three sections of QS-9000?

The three sections of QS-9000 are

- Common requirements, which include the exact text of ISO 9001 and the addition of automotive/heavy trucking requirements.
- Additional requirements covering production part approval process, continuous improvement and manufacturing capabilities.
- Customer-specific requirements.

6. Give the objectives of the internal audit?

The objectives of the internal audit

- a. Determine the actual performance conforms to the documented quality systems.
- b. Initiate corrective action activities in response to deficiencies.
- c. Follow up on noncompliance items of previous audits.
- d. Provide continued improvement in the system through feedback to management.

- e. Cause the audited to think about the process, thereby creating possible improvements.

7. What are the requirements of ISO 14001?

The requirements of ISO 14001 are

- i. General requirements
- ii. Environmental policy
- iii. Planning
- iv. Implementation and operation
- v. Checking and corrective action
- vi. Management review

8. What are the benefits of ISO 14000?

The benefits of ISO 14000 are

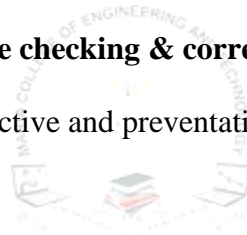
A. Global

- a. Facilitate trade and remove trade barriers
- b. Improve environmental performance of planet earth
- c. Build consensus that there is a need for environment management and a common terminology for EMS.

B. Organizational

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

- a) Monitoring and measuring
- b) Non-conformance and corrective and preventative action
- c) Records
- d) EMS audit



10. 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

11. What are the four elements for the planning of ISO 14001?

- a) Environmental aspects
- b) Legal and other requirements
- c) Objectives and targets
- d) Environmental Management Programs

12. Give the types of Organizational Evaluation Standards?

- 1. Environmental Management System
- 2. Environmental Auditing
- 3. Environmental Performance Evaluation

13. Give the types of Product Evaluation Standards?

1. Environmental Aspects in Product Standards
2. Environmental Labelling
3. Life-Cycle Assessment

14. Define Quality Audits?

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

15. List out the various organisation evaluation standards of ISO 14000 series of standards.

The organisation evaluation standards consists of the following three categories:

- (i) Environmental Management System,
- (ii) Environmental Auditing (EA), and
- (iii) Environmental Performance Evaluation (EPE).

16. List out the various product evaluation standards of ISO 14000 series of standards.

The product evaluation standards consists of the following three categories:

- (i) Environmental Aspects in Product Standards (EAPS),
- (ii) Environmental Labels and Declarations (ELD), and
- (iii) Life Cycle Assessment (LCA).

17. Differentiate the terms environmental aspect and environmental impact.

- *Environmental aspect* is defined as an element of an organization's activities, or services that can interact with the environment.
Examples are waste water discharge, air emissions, and energy usage.
- *Environmental impact* is defined as any change, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products, or services.
Examples are impact on water supply and soil erosion.

18. 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 be quantified when practical.

19. Highlight at least six elements of ISO 14000 standards.

The elements of an EMS standards are:

1. General requirements;
2. Environmental policy,
3. Environmental aspects;
4. Legal aspects;
5. Objectives and targets; and
6. Environmental management programme.

20. What is meant by environmental policy?

The environmental policy should address the following issues:

- (i) Management commitment to continual improvement;
- (ii) Prevention of pollution;
- (iii) Compliance with environmental laws and regulation, cooperation with public authorities;
- (iv) Creating a framework for setting objectives, etc.

21. What is the purpose of EMS audit?

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

Sixteen mark questions

1. Explain the steps to be followed in implementing quality system ISO 9001:2000
2. What are the requirements of ISO 14000? Explain them briefly.
3. Define quality system and explain the evaluation of ISO 9000.
4. Explain ISO 14000 with an Industrial application.
5. Explain the steps followed to get ISO 9000 certification for an educational institute.
6. What are the elements of ISO 9000:2000 quality system?
7. Explain in detail about the quality auditing with its different types.
8. Discuss in briefly about the documentation of quality system.
9. Discuss TQM implementation in manufacturing and service sectors including IT.