

UNIT I - TOTAL QUALITY MANAGEMENT

Total Quality Management (TQM) is an enhancement to the traditional way of doing business.

- | | | |
|------------|---|---|
| Total | - | Made up of the whole |
| Quality | - | Degree of Excellence a Product or Service provides. |
| Management | - | Art of handling, controlling, directing etc. |

TQM 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.

DEFINING QUALITY

Quality can be quantified as follows

$$Q = P/E$$

Where

- | | | |
|---|---|-------------|
| Q | = | Quality |
| P | = | Performance |
| E | = | Expectation |



DIMENSIONS OF QUALITY :

Dimension	Meaning and Example
Performance	Primary product characteristics, such as the brightness of the picture
Features	Secondary characteristics, added features, such as remote control
Conformance	Meeting specifications or industry standards, workmanship
Reliability	Consistency of performance over time, average time of the unit to fail
Durability	Useful life, includes repair
Service	Resolution of problems and complaints, ease of repair
Response	Human – to – human interface, such as the courtesy of the dealer
Aesthetics	Sensory characteristics, such as exterior finish
Reputation	Past performance and other intangibles, such as being ranked first

QUALITY PLANNING

The following are the important steps for quality planning.

1. Establishing quality goals.
2. Identifying customers.
3. Discovering customer needs.
4. Developing product features.
5. Developing process features.
6. Establishing process controls and transferring to operations.

IMPORTANT POINTS TO BE NOTED WHILE QUALITY PLANNING :

1. Business, having larger market share and better quality, earn returns much higher than their competitors.
2. Quality and Market share each has a strong separate relationship to profitably.

3. Planning for product quality must be based on meeting customer needs, not just meeting product specifications.
4. For same products. We need to plan for perfection. For other products, we need to plan for value.

QUALITY COSTS

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 organization and its contracts with customers and society.
- ☐ Quality cost is a cost for poor product of service.

ELEMENTS OF QUALITYCOST:-

- ☐ Cost of prevention
- ☐ Cost of appraisal
- ☐ Cost of internal failures
- ☐ Cost of external failures.

ANALYSIS OF QUALITY COSTS:-

- ☐ Trend analysis
- ☐ Pareto analysis

1. PREVENTION COST

- ☐ Marketing / Customer / User.
- ☐ Product / Service / Design Development.
- ☐ Purchasing
- ☐ Operations (Manufacturing or Service)
- ☐ Quality Administration.

2. APPRAISAL COST

- ☐ Purchasing Appraisal Costs.
- ☐ Operations Appraisal Costs

- ☐ External Appraisal Costs
- ☐ Review of Test and Inspection Data
- ☐ Miscellaneous Quality Evaluations

3. INTERNAL FAILURE COST

- ☐ Product or Service Design Failure Costs (Internal)
- ☐ Purchasing Failure Costs
- ☐ Operations (Product or Service) Failure Costs

4. EXTERNAL FAILURE COST

- ☐ Complaint Investigations of Customer or User Service
- ☐ Returned Goods
- ☐ Retrofit and Recall Costs
- ☐ Warranty Claims
- ☐ Liability Costs
- ☐ Penalties
- ☐ Customer or User Goodwill
- ☐ Lost Sales

ANALYSIS TECHNIQUES OF QUALITY COST

- ☐ The purpose of quality cost analysis is to determine the cost of maintaining a certain level of quality.
- ☐ Such activity is necessary to provide feedback to management on the performance of quality assurance and to assist management in identifying opportunities.

INDEX NUMBERS :

Index Numbers are often used in a variety of applications to measure prices, costs (or) other numerical quantities and to aid managers in understanding how conditions in one period compare with those in other periods.

- A simple type of index is called a RELATIVE INDEX.

QUARTER	COST IN RS.
1	2000
2	2200
3	2100
4	1900

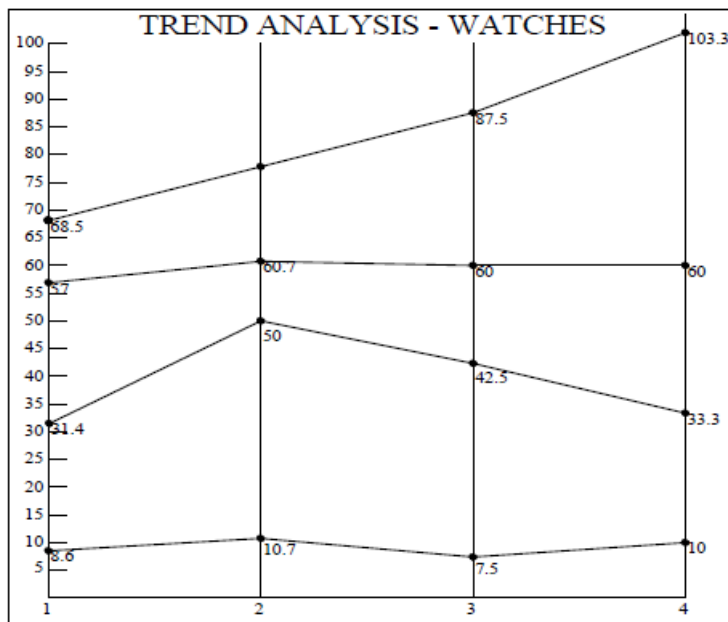
Cost Index in quarter t = (Cost in quarter t / Base period cost) x 100

QUARTER	COST RELATIVE INDEX
1	$(2000/2000) \times 100 = 100$
2	$(2200/2000) \times 100 = 110$
3	$(2100/2000) \times 100 = 105$
4	$(1900/2000) \times 100 = 95$

TREND ANALYSIS :

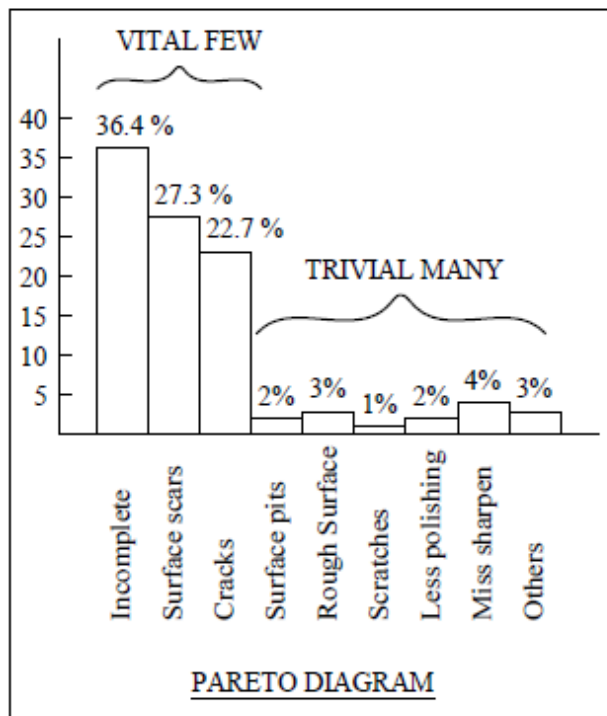
- Good visual aids are important communication tools.
- Graphs are particularly useful in presenting comparative results to management.

Trend Analysis is one where Time-to-Time comparisons can be made which illustrates



PARETO ANALYSIS :

- Joseph Juran observed that most of the quality problems are generally created by only a few causes.
- For example, 80% of all internal failures are due to one (or) two manufacturing problems.
- Identifying these “vital few” and ignoring the “trivial many” will make the corrective action give a high return for a low money input.



BASIC CONCEPTS OF TOTAL QUALITY MANGEMENT:-

- Top management committed to quality in all aspects
 - Customers focus of the organization
 - Process focus and improvement
 - Measurement of performance
 - Employee invalment and empowerment
 - Continuous improvement
 - Bench marking
 - Teams
-

- Supplier teaming
- Training of employees
- Inventory management
- Communication
- Quality cost.

PILLARS OF TQM:-

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

PRINCIPLES OF TQM:-

- Customer"s requirements must be met the first time, every time.
- There must be agreed requirements, for both internal and external customers.
- Everybody must be involved, from all levels and across all functions.
- Regular communication with staff at levels is must. Two way communication at all levels must be promoted.
- Identifying training needs and relating them with individual capabilities and requirements is must.
- Top management"s participation and commitment is must.
- A culture of continuous improvement must be established.
- Emphasis should be placed on purchasing and supplier management
- Every job must add value.
- Quality improvement must eliminate wastes and reduce total cost.
- There must be a focus on the prevention of problems.
- A culture of promoting creativity must be established.
- Performance measure is a must at organization, department and individual levels. It helps to asses and meet objectives of quality.

- There should be focus on team work.

SIX BASIC CONCEPTS OF TOTAL QUALITY MANAGEMENT

1. Management Commitment
2. Customer Focus
3. Involvement and utilization of entire work force
4. Continuous Improvement
5. Treating Suppliers as Partners
6. Establish Performance Measures for the processes

NEW AND OLD CULTURES :

QUALITY ELEMENT PREVIOUS STATE TQM

DEFINITION ORIENTED

PRODUCT ORIENTED

CUSTOMER

Priorities

Second to service

First among equals of and

DECISIONS

SHORT TERM

LONG TERM

Emphasis

Detection

Prevention

Errors

Responsibility

Operations

System

Problem

Solving

Quality control

Everyone

Teams

Procurement

Price

Life cycle

costs,

Partnership

Manager"s Role

and enforce

Plan, assign, control

Delegate, coach,

facilitate and mentor

GURUS OF TQM :

SHEWHART

- Control chart theory
- PDCA Cycle

DEMING

- Statistical Process Control

JURAN

- Concepts of SHEWHART
- Return on Investment (ROI)

FEIGANBAUM

- Total Quality Control
- Management involvement
- Employee involvement
- Company wide quality control

ISHIKAWA

- Cause and Effect Diagram
- Quality Circle concept

CROSBY

- "Quality is Free"
- Conformance to requirements

TAGUCHI

- Loss Function concept

OBSTACLES IN IMPLEMENTING TQM :

- ☐ 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
- ☐ Failure to continually improve

BENEFITS OF TQM :

- ☐ Improved quality
- ☐ Employee participation
- ☐ Team work
- ☐ Working relationships
- ☐ Customer satisfaction
- ☐ Employee satisfaction
- ☐ Productivity
- ☐ Communication
- ☐ Profitability
- ☐ Market share

LEADERSHIP

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".

CHARACTERISTICS FOR LEADERSHIP:-

The customers first. Value people.

Built supplier partnership.

Empower people.

Demonstrate involvement/commitment. Strive for excellence.

Explain and deploy policy. Improve communication. Promote teamwork. Benchmark continuously. Establish system. Encourage collaboration.

LEADERSHIP ROLES:-

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

Leaders

- ☐ Shape the Organization"s value
- ☐ Promote the Organization"s value
- ☐ Protect the Organization"s value and
- ☐ Exemplifies the Organization values

CHARACTERISTICS OF QUALITY LEADERS :

1. They give priority attention to external and internal customers and their needs.

2. They empower, rather than control, subordinates.
3. They emphasis improvement rather than maintenance.
4. They emphasis prevention.
5. They emphasis collaboration rather than competition.
6. They train and coach, rather than direct and supervise.

7. They learn from the problems.
8. They continually try to improve communications.
9. They continually demonstrate their commitment to quality.
- 10.They choose suppliers on the basis of quality, not price.
- 11.They establish organizational systems to support the quality effort.
- 12.They encourage and recognize team effort.

LEADERSHIP CONCEPTS :

A leader should have the following concepts

1. People, Paradoxically, need security and independence at the same time.
2. People are sensitive to external and punishments and yet are also strongly self-motivated.
3. People like to hear a kind word of praise. Catch people doing something right, so you can pat them on the back.
4. People can process only a few facts at a time; thus, a leader needs to keep things simple.
5. People trust their gut reaction more than statistical data.
6. People distrust a leader`s rhetoric if the words are inconsistent with the leader`s actions.

THE 7 HABITS OF HIGHLY EFFECTIVE PEOPLE :

1. Be Proactive
2. Begin with the End in mind

3. Put First Things First
4. Think Win – Win
5. Seek First to Understand, then to Be Understood
6. Synergy
7. Sharpen the Saw (Renewal)

ROLE OF SENIOR MANAGEMENT

1. Management by Wandering Around (MBWA).
2. Strategy of problem solving and decision making.
3. Strong information base.
4. Recognition and Reward system.
5. Spending most of the time on Quality.
6. Communication.
7. Identify and encourage potential employee.
8. Accept the responsibility.
9. To play a role model.
10. Remove road blocks.
11. Study TQM and investigate how TQM is implemented elsewhere.
12. Establish policies related to TQM.
13. Establish „priority of quality“ and „customer satisfaction“ as the basic policy.
14. Assume leadership in bringing about a cultural change.
15. Check whether the quality improvement programmes are conducted as planned.
16. Become coaches and cheer leaders to implement TQM.
17. Generate enthusiasm for TQM activities.
18. Visit other companies to observe TQM functioning.
19. Attend TQM training programme.

20. Teach others for the betterment of society and the surroundings.

QUALITY COUNCIL

A quality council is established to provide overall direction. The council is composed of

- ☐ Chief Executive Officer
- ☐ Senior Managers
- ☐ Coordinator or Consultant
- ☐ A representative from the Union

Duties of the council are

- ☐ Develop the core values, vision statement, mission statement and quality policy statement
- ☐ Develop the strategic long term plan with goals and Annual Quality improvement Program with objectives
- ☐ Create the total education and training plan
- ☐ Determine and monitor the cost of poor quality
- ☐ Determine the performance measures
- ☐ Determine projects those improve the process
- ☐ Establish multifunctional project and work group teams
- ☐ Revise the recognition and rewards system

A typical meeting agenda will have the following items

- ☐ Progress report on teams
- ☐ Customer satisfaction report
- ☐ Progress on meeting goals
- ☐ New project teams
- ☐ Benchmarking report

Within three to five years, the quality council activities will become ingrained in the culture of the organization.

QUALITY STATEMENTS



VISION STATEMENT :

- ☐ It is a short declaration of what an organization aspires to be tomorrow. Example :

Disney Theme Park - Happiest place on earth

Polaroid - Instant photography

- ☐ Successful visions provide a guideline for decision making

MISSION STATEMENT :

It answers the following questions

- ☐ Who are the customers?
- ☐ What we do?
- ☐ How we do it?

It describes the function of the organization. It provides a clear statement of purpose for employees, customers & suppliers

A simpler mission statement is

-To meet customers transportation and distribution needs by being the best at moving their goods on time, safely and damage free ||

- NATIONAL RAILWAYS

QUALITY POLICY STATEMENT :

It is guide for everyone in the organization as to how they should provide products and services to the customers.

Common characteristics are

- ☐ Quality is first among equals
- ☐ Meet the needs of the internal & external customers
- ☐ Equal or exceed competition
- ☐ Continuously improve the quality
- ☐ Utilize the entire workforce

STRATEGIC QUALITY PLANNING

Goals – Long term planning (Eg : in the war)

Objectives – Short term planning (Eg : Capture the bridge)

Goals should

- ☐ Improve customer satisfaction, employee satisfaction and process
- ☐ Be based on statistical evidence
- ☐ Be measurable
- ☐ Have a plan or method for its achievement
- ☐ Have a time frame for achieving the goal
- ☐ Finally, it should be challenging yet achievable

SEVEN STEPS TO STRATEGIC QUALITY PLANNING :

- | | |
|-------------------------|--------------------|
| 1. Customer needs | 5. Closing the gap |
| 2. Customer positioning | 6. Alignment |
| 3. Predict the future | 7. Implementation |
| 4. Gap analysis | |

TQM IMPLEMENTATION :

- ☐ Begins with Management Commitment
- ☐ Leadership is essential during every phase of the implementation process and particularly at the start
- ☐ Senior Management should develop an implementation plan
- ☐ Timing of the implementation process is very important

DEMING PHILOSOPHY



Managers and First Line Supervisors is essential
n is a must
e organization
nd problem solving
ier surveys must be conducted to benchmark
ject teams and work groups and monitors their progress

1. Create and publish the Aims and Purposes of the organization.
2. Learn the New Philosophy.
3. Understand the purpose of Inspection.
4. Stop awarding business based on price alone.
5. Improve constantly and forever the System.
6. Institute Training.
7. Teach and Institute Leadership.
8. Drive out Fear, Create Trust and Create a climate for innovation.
9. Optimize the efforts of Teams, Groups and Staff areas.
10. Eliminate exhortations for the Work force.
- 11a. Eliminate numerical quotas for the work force.
- 11b. Eliminate Management by objectives.

- 12 Remove Barriers THAT ROB PEOPLE OF PRIDE OF WORKMANSHIP.
13. Encourage Education and Self-improvement for everyone. Take action to accomplish the transformation.

QUESTION BANK

UNIT- I INTRODUCTION-TQM

PART – A (2 MARKS)

1. Define Total Quality?
2. Define Quality?
3. What are the Dimensions of Quality?
4. Give the Basic Concepts of TQM?
5. Give the Principles of TQM?
6. Give the Obstacles associated with TQM Implementation?
7. Give the Analysis Techniques for Quality Costs?
8. Define Quality Costs?
9. Give the primary categories of Quality cost?
10. Give the typical cost bases?
11. How will you determine the optimum cost?
12. State the Quality Improvement Strategy?
13. Define Quality Planning?
14. Give the Objectives of TQM?
15. What is needed for a leader to be effective?
16. What is the important role of senior management?

17. What are the general duties of a quality council?
18. What does a typical meeting agenda contain after establishing the TQM?
19. What are the various quality statements?
20. Give the basic steps to strategic quality planning?
21. What is a quality policy?

DEMING PHILOSOPHY



techniques used for Quality cost? (16)

16)

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lementation? (16)

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UNIT II – TQM PRINCIPLES AND CUSTOMER SATISFACTION

Customer satisfaction, a [business term](#), is a measure of how products and services supplied by a company meet or surpass customer expectation. It is seen as a key performance indicator within business and is part of the four of a [Balanced Scorecard](#).



□ In a competitive marketplace where businesses compete for customers, customer satisfaction is seen as a key differentiator and increasingly has become a key element of business strategy.

- Performance
- Features
- Service
- Warranty
- Price
- Reputation

Customer complaints:-

- ☐ Satisfied
- ☐ Dissatisfied customer
- ☐ Totally satisfied customer contributes to monitored.

FEEDBACK (INFORMATION COLLECTING TOOLS):

Feedback enables organization to

- ☐ Discover customer satisfaction
- ☐ Discover relative priorities of quality
- ☐ Compare performance with the competition
- ☐ Identify customer needs
- ☐ Determine opportunities for improvement

Listening to the voice of the customer can be accomplished by numerous information collecting tools.

1. Comment Card
2. Customer Questionnaire

<u>Highly</u>				<u>Neutral</u>			<u>Highly</u>
<u>Satisfied</u>							<u>Dissatisfied</u>
1.	Trash removal	5	4	3	2		1
2.	Personal hygiene	5	4	3	2		1
3.	Romance	5	4	3	2		1

4.	Thoughtfulness	5	4	3	2	1
5.	Listening skills	5	4	3	2	1
6.	Faithfulness	5	4	3	2	1
7.	Respect for					
	Mother – in - law	5	4	3	2	1
8.	Overall,how satisfied are you with your					
	Marriage?	5	4	3	2	1

To make surveys more useful, it is best to remember eight points

- ☐ Clients and Customers are not the same
- ☐ Surveys raise customers expectations
- ☐ How you ask a question will determine how the question is answered
- ☐ The more specific the question, the better the answer
- ☐ You have only one chance and only 15 minutes
- ☐ The more time you spend in survey development, the less time you will spend in data analysis and interpretation
- ☐ Who you ask is as important as what you ask
- ☐ Before the data are collected, you should know how you want to analyse and use the data

3. Focus Groups

These groups are very effective for gathering information on customer expectations and requirements.

4. Toll – Free Telephone Numbers

5. Customer Visits

6. Report Card

7. The Internet and Computers

8. Employee Feedback

9. Mass Customization

USING CUSTOMER COMPLAINTS :

Actions an organization can take to handle complaints are as follows

- Investigate customers experiences by actively getting feed back, both positive and negative, and then acting on it promptly
- Develop procedures for complaint resolution that include empowering front – line personnel.
- Analyze complaints, but understand that complaints do not always fit into neat categories.
- Work to identify process and material variations and then eliminate the root cause. “More inspection” is not corrective action.
- 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.
- Provide a monthly complaint report to the quality council for their evaluation and, if needed, the assignment of process improvement teams.
- Identify customers“ expectations beforehand rather than afterward through complaint analysis.

SERVICE QUALITY

Customer service is the set of activities an organization uses to win and retain customer“ s satisfaction. It can be provided before, during, or after the sale of the product or exist on its own.

Elements of customer service are

ORGANIZATION

1. Identify each market segment.
2. Write down the requirements.
3. Communicate the requirements.

4. Organize processes.
5. Organize physical spaces.

CUSTOMER CARE

6. Meet the customer" s expectations.
7. Get the customer" s point of view.
8. Deliver what is promised.
9. Make the customer feel valued.
10. Respond to all complaints.
11. Over – respond to the customer.
12. Provide a clean and comfortable customer reception area.

COMMUNICATION

13. Optimize the trade – off between time and personal attention.
14. Minimize the number of contact points.
15. Provide pleasant, knowledgeable and enthusiastic employees.
16. Write document in customer friendly language.

FRONT-LINE PEOPLE

17. Hire people who like people.
18. Challenge them to develop better methods.
19. Give them the authority to solve problems.
20. Serve them as internal customers.
21. Be sure they are adequately trained.
22. Recognize and reward performance.
23. Lead by example.
24. Listen to the front-line people.
25. Strive for continuous process improvement.

LEADERSHIP

CHARACTERISTICS AND EXPECTATIONS : **Characteristic Expectation**

Delivery Delivered on schedule in undamaged condition

Installation Proper instructions on setup, or technicians supplied for complicated products

Use Clearly-written training manuals or instructions provided on proper use

Field repair Properly-trained technicians to promptly make quality repairs

Customer Service Friendly service representatives to answer questions

Warranty Clearly stated with prompt service on claims

CUSTOMER RETENTION

It means “retaining the customer” to support the business. It is more powerful and effective than customer satisfaction.

For Customer Retention, we need to have both “Customer satisfaction & Customer loyalty”.

The following steps are important for customer retention.

1. Top management commitment to the customer satisfaction.
2. Identify and understand the customers what they like and dislike about the organization.
3. Develop standards of quality service and performance.
4. Recruit, train and reward good staff.
5. Always stay in touch with customer.
6. Work towards continuous improvement of customer service and customer retention.
7. Reward service accomplishments by the front-line staff.
8. Customer Retention moves customer satisfaction to the next level by determining what is truly important to the customers.
9. Customer satisfaction is the connection between customer satisfaction and bottom line.

EMPLOYEE INVOLVEMENT

- Employee involvement is one approach to improve quality and productivity.
- It is a means to better meet the organization's goals for quality and productivity.

MOTIVATION :MASLOW'S HIERARCHY OF NEEDS :

Self - Actualization



Esteem



Social



Security



Survival

EMPLOYEE WANTS :

FACTOR	EMPLOYEE RATING	MANAGER RATING
<hr/>		
Interesting work	1	5
Appreciation	2	8
Involvement	3	10
Job security	4	2
Good Pay	5	1
Promotion/ growth	6	3
Good working conditions	7	4
Loyalty to employees	8	7
Help with personal problems	9	9
Tactful discipline	10	6

ACHIEVING A MOTIVATED WORK FORCE :

The building of a motivated work force is for the most part an indirect process. Concepts to achieve a motivated work force are as follows:

1. Know thyself.
2. Know your employees.
3. Establish a positive attitude.
4. Share the goals.
5. Monitor progress.
6. Develop interesting work.
 - ☐ Job rotation
 - ☐ Job enlargement
 - ☐ Job enrichment
7. Communicate effectively
8. Celebrate success.

EMPLOYEE SURVEYS :

Employee surveys help managers assess the current state of employee relations, identify trends, measure the effectiveness of program implementation, identify needed improvements, and increase communication effectiveness.

- | | |
|----------|--|
| STEP 1 : | The Quality Council to create a multifunctional team |
| STEP 2 : | The Team will develop survey instrument |
| STEP 3 : | Administer the survey |

STEP 4 : Results are compiled and analyzed

STEP 5 : Determine areas for improvement

- Employee involvement is creating an environment in which people have an impact on decisions and actions that affect their jobs. Tell: the supervisor makes the decision and announces it to staff. The supervisor provides complete direction.
- Sell: the supervisor makes the decision and then attempts to gain commitment from staff by "selling" the positive aspects of the decision.
- Consult: the supervisor invites input into a decision while retaining authority to make the final decision herself.
- Join: the supervisor invites employees to make the decision with the supervisor. The supervisor considers her voice equal in the decision process.

To round out the model, I add the following.

- Delegate: the supervisor turns the decision over to another party.

SEVEN RULES OF MOTIVATION

#1 Set a major goal, but follow a path. The path has mini goals that go in many directions. When you learn to succeed at mini goals, you will be motivated to challenge grand goals.

#2 Finish what you start. A half finished project is of no use to anyone. Quitting is a habit. Develop the habit of finishing self-motivated projects.

#3 Socialize with others of similar interest. Mutual support is motivating. We will develop the attitudes of our five best friends. If they are losers, we will be a loser. If they are winners, we will be a winner. To be a cowboy we must associate with cowboys.

#4 Learn how to learn. Dependency on others for knowledge supports the habit of procrastination. Man has the ability to learn without instructors. In fact, when we learn the art of self-education we will find, if not create, opportunity to find success beyond our

wildest dreams.

#5 Harmonize natural talent with interest that motivates. Natural talent creates motivation, motivation creates persistence and persistence gets the job done.

#6 Increase knowledge of subjects that inspires. The more we know about a subject, the more we want to learn about it. A self-propelled upward spiral develops.

#7 Take risk. Failure and bouncing back are elements of motivation. Failure is a learning tool. No one has ever succeeded at anything worthwhile without a string of failures.

EMPOWERMENT

Empowerment is investing people with authority. Its purpose is to tap the enormous reservoir of potential contribution that lies within every worker. The two steps to empowerment are

1. To arm people to be successful through coaching, guidance and training.
2. Letting people do by themselves.

The principles of empowering people are given below.

1. Tell people what their responsibilities are.
2. Give authority.
3. Set standards for excellence.
4. Render training.
5. Provide knowledge and information.
6. Trust them.
7. Allow them to commit mistakes.
8. Treat them with dignity and respect. Three dimensions of empowerment are

- ☐ Capability
- ☐ Alignment and
- ☐ Trust

Employee involvement is optimized by the use of teams.

- ☐ A *team* is 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.

WHY TEAMS WORK :

1. Many heads are more knowledgeable than one.
2. The whole is greater than the sum of its members.
3. Team members develop a rapport with each other.
4. Teams provide the vehicle for improved communication.

TYPES OF TEAMS :

1. Process improvement team.
2. Cross – functional team.
3. Natural work teams.
4. Self – Directed / Self – Managed work teams.

CHARACTERISTICS OF SUCCESSFUL TEAMS :

- | | |
|---------------------|------------------------------------|
| 1. Sponsor | 2. Team Charter |
| 3. Team Composition | 4. Training |
| 5. Team Cohesion | 6. Clear Objectives |
| 7. Team Norms | 8. Well-Defined decision procedure |
| 9. Team Processes | 10. Trust |
| 11. Team Structure | 12. Open Communication |
| 13. Team Climate | 14. Balanced Participation |

TEAM MEMBER ROLES :





TEAM LEADER

- ☐ Ensures the smooth and effective operation of the team.
- ☐ Facilitates the team process.
- ☐ Serves as a Contact Point.
- ☐ Organizes the implementation of changes.
- ☐ Prepares the meeting agenda.

FACILITATOR

- ☐ Supports the leader.
- ☐ Focuses on the team process.
- ☐ Acts as a resource to the team.
- ☐ Provides feedback to the team.

RECORDER

- ☐ Documents the main ideas of the team's discussion, the issues raised, decisions made, action items etc.
- ☐ Presents the documents and distributes the MOM.
- ☐ Participates as a team member.

TIMEKEEPER

- ☐ Ensures that the team maintains the schedule.
- ☐ Participates as a team member.

TEAM MEMBER

- ☐ Contributes best, without reservation.
- ☐ Respects other people's contributions.
- ☐ Listens carefully and asks questions.
- ☐ Works for consensus on decisions.
- ☐ Supports the decision of the team.
- ☐ Understands and is committed to the team objectives.

Respects and is tolerant of individual differences.

- ☐ Acknowledges and works through conflict openly.
- ☐ Carries out assignments.

DECISION MAKING METHODS :

1. Non-decision.
2. Unilateral decision.
3. Handclasp decision.
4. Minority-rule decision.
5. Majority-rule decision.
6. Consensus.

COMMON BARRIERS TO TEAM PROGRESS :

- ☐ 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.
- ☐ Project objectives are not significant.
- ☐ No clear measures of success.
- ☐ No time to do improvement work.

RECOGNITION AND REWARD

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

Various ways for Recognition and Rewards are

1. Recognition can be expressed using verbal and written praise.
2. Rewards may be in the form of certificates and plaques.
3. Reward is normally in the form of cinema tickets, dinner for family etc.
4. The financial compensation (for recognition) can be paid in terms of increased salaries, commissions, gain sharing etc.
5. The efforts of employees can be recognized by promotions, special job assignments etc.
6. A letter of appreciation from the CEO or the Top Management will increase the employee's involvement.
7. Reward may be delayed but recognition should be in a timely basis.
8. Rewards should be appropriate to the improvement level.
9. People like to be recognized than any reward.
10. Special forms of recognition include pictures on the bulletin board, articles in news letters, letter to families etc.
11. Supervisors can give on-the-spot praise for a job which is done well.

EFFECTS OF RECOGNITION AND REWARD SYSTEM :

1. Recognition and reward go together for letting people know that they are valuable members for the organization.
2. Employee involvement can be achieved by recognition and reward system.
3. Recognition and reward system reveals that the organization considers quality and productivity as important.

4. It provides the organization an opportunity to thank high achievers.
5. It provides employees a specific goal to achieve.
6. It motivates employees to improve the process.
7. It increases the morale of the workers.

PERFORMANCE APPRAISAL

The performance appraisal is used to let employees know how they are performing. The performance appraisal becomes a basis for promotions, increase in salaries, counseling and other purposes related to an employee's future.

IMPORTANCE OF PERFORMANCE APPRAISALS :

1. It is necessary to prevail a good relationship between the employee and the appraiser.
2. Employee should be informed about how they are performing on a continuous basis, not just at appraisal time.
3. The appraisal should highlight strength and weakness and how to improve the performance.
4. Employee should be allowed to comment on the evaluation and protest if necessary.
5. Everyone should understand that the purpose of performance appraisal is to have employee involvement.
6. Errors in performance evaluations should be avoided.
7. Unfair and biased evaluation will render poor rating and hence should be eliminated.

BENEFITS OF EMPLOYEE INVOLVEMENT :

Employee involvement improves quality and increases productivity because

- ☐ Employees make better decisions using their expert knowledge of the process
- ☐ Employees are better able to spot and pin-point areas for improvement.
- ☐ Employees are better able to take immediate corrective action.
- ☐ Employee involvement reduces labour / management friction.

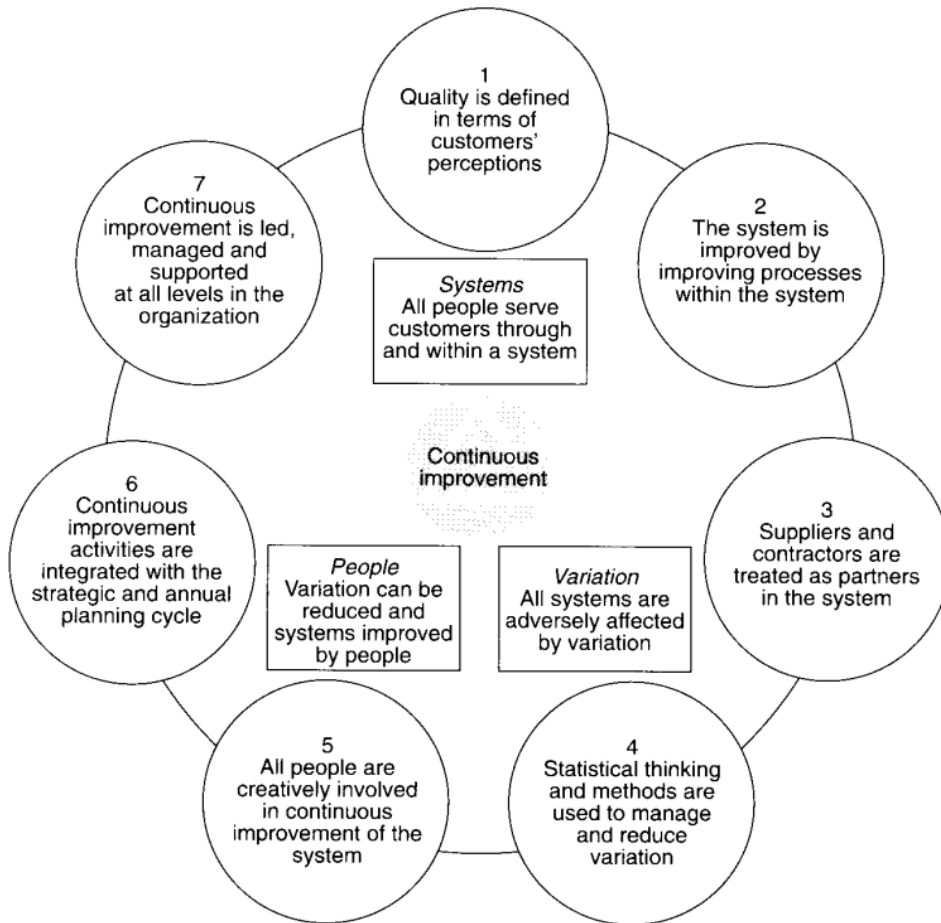
- Employee involvement increases morale.
- Employees have an increased commitment to goals because they are involved.



CONTINUOUS PROCESS IMPROVEMENT

Continuous process improvement is designed to utilize the resources of the organization to achieve a quality-driven culture.





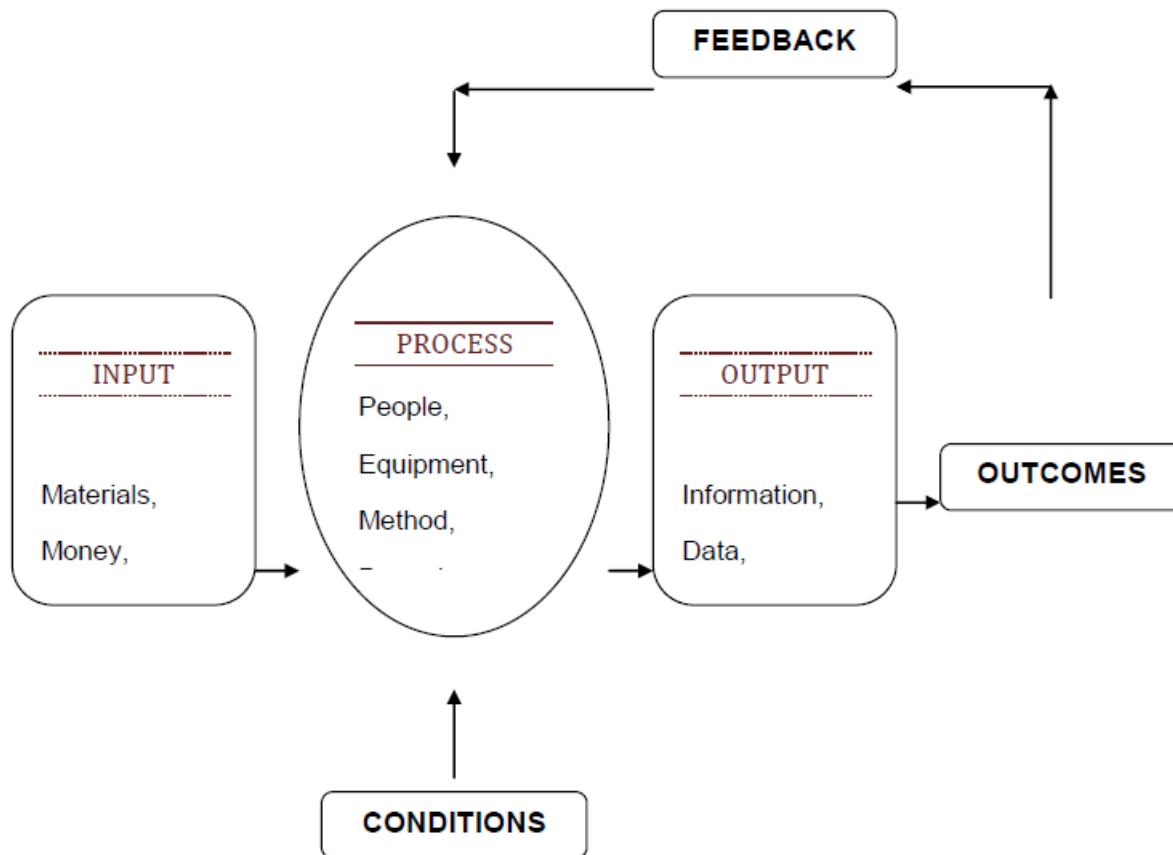
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Improvement is made by

- Viewing all work as process.
- Making all process effective, efficient and adaptable.
- Anticipating changing customer needs.
- Controlling in-process performance using measures such as scrap reduction, control charts etc.
- Eliminating waste and re-work.
- Eliminating non-value added activities.
- Eliminating non-conformities.
- Using Benchmarking.
- Incorporating learned lessons into future activities.
- Using technical tools such as SPC, benchmarking, experimental design, QFD etc.

PROCESS :

Process refers to business and production activities of an organization



INPUT / OUTPUT PROCESS MODEL

There are five basic ways for improvement.

- 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.

THE JURAN TRILOGY

1. PLANNING

- ☐ Determine internal & external customers.
- ☐ Their needs are discovered.
- ☐ Develop product / service features.
- ☐ Develop the processes able to produce the product / service features.
- ☐ Transfer plans to operations.

2. CONTROL

Control is used by operating forces to help meet the product, process and service requirements.

It consists of the following steps

1. Determine items to be controlled.
2. Set goals for the controls.
3. Measure actual performance.
4. Compare actual performance to goals.
5. Act on the difference.

3. IMPROVEMENT

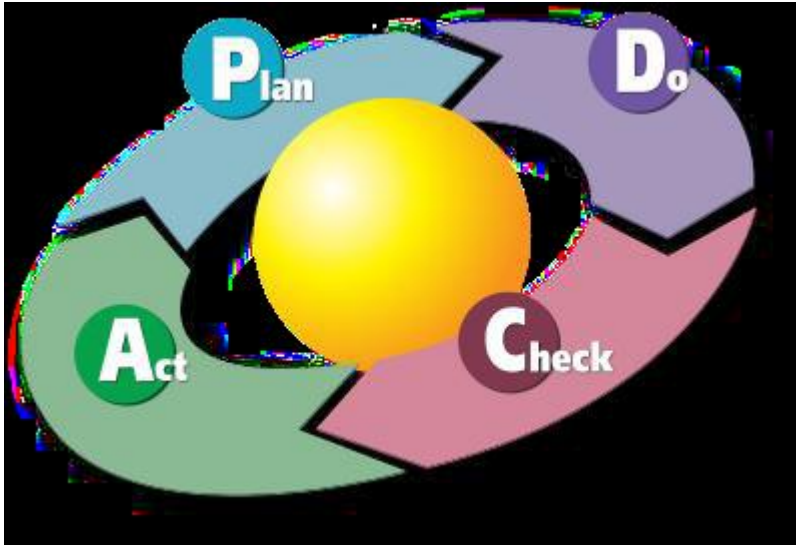
Aims to attain levels of performance that are higher than current levels.

It consists of the following steps

- ☐ Establishment of quality council.
- ☐ Identify the improvement projects.
- ☐ Establish the project teams with a project leader.

□ Provide the team with the resources.

THE PDCA CYCLE :



PROBLEM SOLVING METHOD :

1. IDENTIFY THE OPPORTUNITY

- Identify the Problem
- Pareto analysis of external alarm signals.
- Pareto analysis of internal alarm signals.
- Proposals from key insiders.
- Proposals from suggestion schemes.
- Field study of user" s needs.
- Comments of key people outside the organization.
- Customer surveys.
- Employee surveys.
- Brainstorming by work groups.

- Form the Team
- Team should be selected.
- Goals and milestones are established.
- Define the Scope.

Criteria for a good problem statement is as follows

- It clearly describes the problem.
- It states the effect.
- It focuses on what is known, unknown etc.
- It emphasizes the impact on the customer.

2. ANALYZE THE CURRENT PROCESS

The objective is to understand the process and how it is currently performed.

Step 1 : The team to develop a process flow diagram.

Step 2 : The target performance measures are defined.

Step 3 : Collection of all available data and information.

Common items of data and information are

1. Customer information
2. Design information
3. Process information
4. Statistical information
5. Quality information
6. Supplier information

3. DEVELOP THE OPTIMAL SOLUTION(S)

This phase has the objective of establishing potential and feasible solutions and recommending the best solution to improve the process.

- Creativity plays the major role, and brainstorming is the principal technique.
- There are three types of creativity:
- Create new processes
- Combine different processes

- Modify the existing process

4. IMPLEMENT CHANGES

□ This phase has the objective of preparing the implementation plan, obtaining approval and implementing the process improvements.

- Approval of the quality council.

- Obtain the advice and consent of departments, functional areas, teams, individuals etc.

- Monitor the activity.

5. STUDY THE RESULTS

This phase has the objective of monitoring and evaluating the change by tracking and studying the effectiveness of the improvement efforts.

6. STANDARDIZE THE SOLUTION

- Institutionalize by positive control of the process.

- The quality peripherals – the system, environment and supervision must be certified.

- Operators must be certified.

7. PLAN FOR THE FUTURE

The objective is to achieve improved level of process performance.

- Regularly conduct reviews of progress by the quality council.

- Establish the systems to identify area for future improvements.

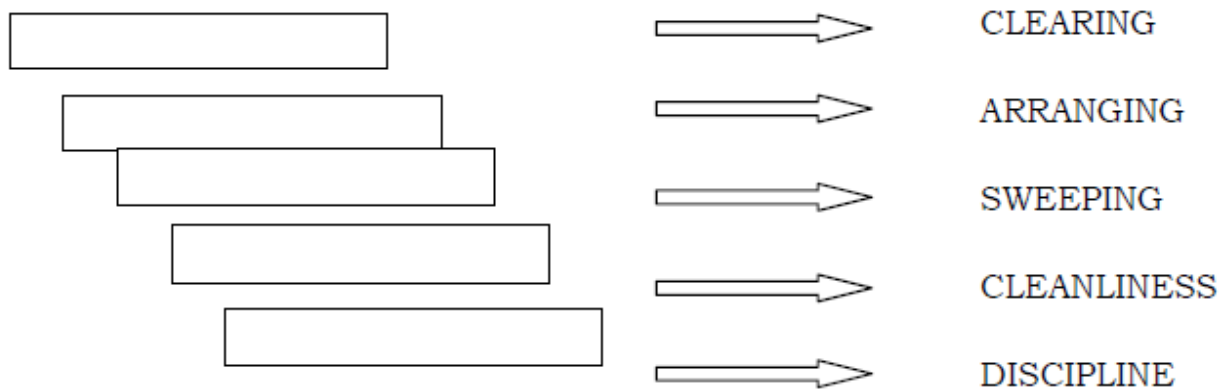
- Track performance with respective internal & external customers.

- TQM tools and techniques are used to improve quality, delivery and cost.



5-S : HOUSEKEEPING

5-S MEANS EVERYTHING IN ITS PLACE



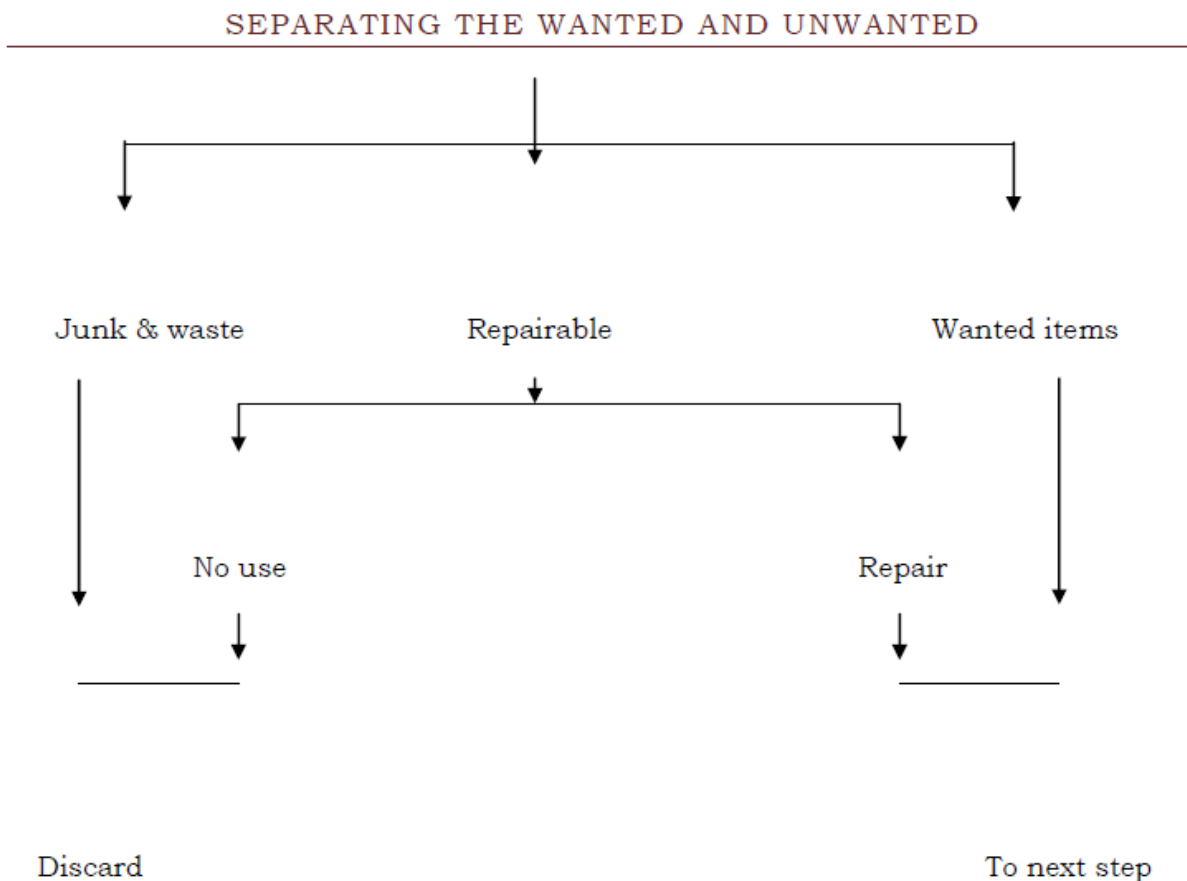
There can be no TQM without 5-S.

□ A dirty factory cannot produce quality products.

□ Clutter hides problems. A neat workplace promotes easy discovery of abnormalities.

The First S : SEIRI : CLEARING

Flow Chart :



Consequences of not practicing SEIRI :

□ The unwanted clutters up the place and the wanted are hard to find.

- Every place can only hold so much.
- Clutter sometimes causes misidentification.

THE SECOND S : SEITON : ARRANGING

ARRANGE EVERYTHING IN PROPER ORDER SO THAT IT CAN BE EASILY PICKED UP FOR USE.

Factory Floor

- ◆ Unlabelled tool crib
- ◆ Cluttered shelves
lockers etc.
- ◆ Stores – no clear
location system.
- ◆ Things on the floor

Office

- ◆ Unlabelled file cabinet
- ◆ Cluttered drawer,
shelves, book cases,
tables
- ◆ Records & documents
Not arranged well
- ◆ File heaps and papers

Home

- ◆ Clutter
- ◆ No orderly
arrangement in
the rooms

Consequences of not practicing SEITON :

- Things are seldom available when needed.
- Items are “lost” in stores.
- Items – defectives and good ones get mixed up.
- Accidents or near-accidents occur due to clutter.
- Visual control of the shop floor is not possible.

Sometimes, production is lost because an item required is available but cannot be found.

□ In some offices, Critical Excise records or tax records may not be traceable. This can lead to finance loss, prosecution or embarrassment

THE THIRD S : SEISO : SWEEP

SWEEP YOUR WORKPLACE THOROUGHLY SO THAT THERE IS NO DUST ANYWHERE

Factory Floor

- ◆ Dirty machines
- ◆ Dust on product parts, R.Mtls.
- ◆ Dirty jigs, fixtures
- ◆ Dirty walls, roofs
- ◆ Littered floor

Office

- ◆ Dirty table & furniture
- ◆ Dirty office equipments
- ◆ Littered floor
- ◆ Dirty windows

Home

- ◆ Dirty furniture, floor, window, grills, bookshelves.

Consequences of not practicing SEISO :

- Most machines are affected by dust & dirt and hence their performance may go down.
- Dust and dirt on products, materials, packing boxes etc. will affect either their performance quality or their aesthetic look.
- Unpleasant to work in

THE FOURTH S : SEIKETSU : CLEANLINES

WASHING WITH A STRONG OVERTONE OF KEEPING THINGS DISINFECTED AS WELL AS FREE OF HAZARDOUS CHEMICALS.

Factory Floor

- ◆ Handling hazardous chemicals
- ◆ Control of fumes, hazardous dust.
- ◆ Disinfecting, Personal hygiene

Office

- ◆ Free of pests
- ◆ Personal hygiene

Home

- ◆ Pest control
- ◆ Personal hygiene

Consequences of not practicing SEIKETSU :

- Good health and safety require the practice of Seiketsu.
- Hazardous chemicals, dusty chemicals, fumes etc. can make it a dangerous place to work in.
- Washing thoroughly and cleaning a place makes the workplace pleasant.
- Personal hygiene is essential for healthy workforce.

THE FIFTH S : SHITSUKI : DISCIPLINE

DISCIPLINE ESPECIALLY WITH REGARD TO SAFETY RULES AND

Consequences of not practicing SEIKETSU :

- If discipline is not practiced, then the first 4-S would backslide.
- Lack of Shitsuki means not following the standards. Then, all activities related to safety and quality will be affected.

IMPLEMENTING 5-S

Top Management resolve and training.

2. Formation of a top level team.
3. Understanding current circumstances.
4. Establishing priorities and targets.
5. Forming sub-teams and training.
6. Major cleaning.
7. Establishing improvement plans in each priority area.
8. Implementing the plan.
9. Verifying results.
10. Standardizing.
11. Establishing full control.
12. Looking for further improvements.

KAIZEN

Kaizen is a Japanese word for the philosophy that defines management's roles in continuously encouraging and implementing small improvements involving everyone.

It focuses on simplification by breaking down complex progress into their sub – processes and then improving them.

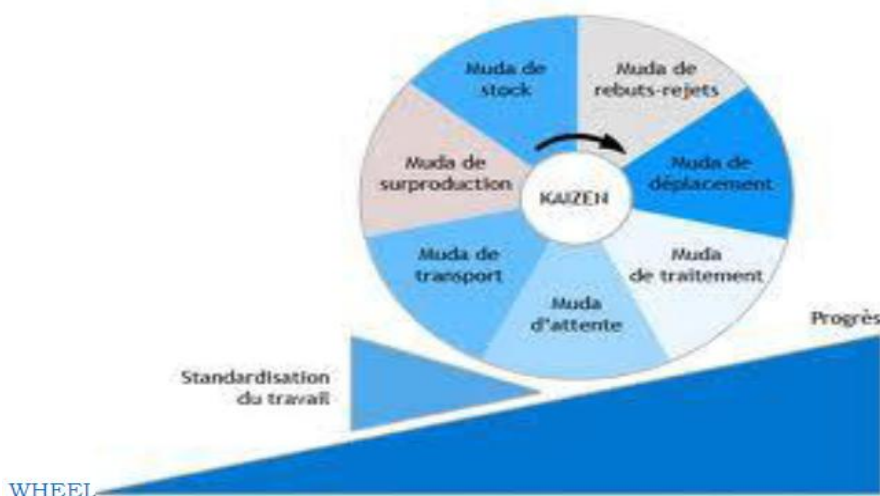
The Kaizen improvement focuses on the use of :

- Value – added and non – value work activities.
- Muda, which refers to the seven classes of waste – over-production, delay, transportation, processing, inventory, wasted motion, and defective parts.
- Principles of motion study and the use of cell technology.
- Principles of materials handling and use of one – piece flow.
- Documentation of standard operating procedures

The five S" s for workplace organization.

- Visual management.
- Just – in – time principles.
- Poka – Yoke.
- Team dynamics

KAIZEN



RE-ENGINEERING

It is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical measures of performance.

SUPPLIER PARTNERSHIP

The suppliers should be treated as partners to achieve the same quality level as attained within the organization.

The following forces need Supplier Partnership to improve quality, reduce costs and increase market share.

- ☐ Deming Philosophy (Deming's 4th point)
- ☐ Just-in-time
- ☐ Continuous process improvement
- ☐ ISO 9000

CUSTOMER – SUPPLIER RELATIONS :

Dr. Kaoru Ishikawa has given ten principles of customer-supplier relations. They are

1. Both the customer and supplier are fully responsible for the control of quality.
2. Both the customer and supplier should be independent of each other.
3. The customer is responsible for providing the supplier with clear and sufficient requirements so that the customer can know precisely what to produce.
4. Both the customer and supplier should enter into a non-adversarial contract.
5. The supplier is responsible for providing the quality that will satisfy the customer.
6. Both the customer and supplier should decide the method to evaluate the quality of the product or services.
7. Both the customer and supplier should establish in the contract the method by which they can reach an amicable settlement in case of any dispute.
8. Both the customers and supplier should continually exchange information.
9. Both the customer and supplier should perform business activities.
10. Both the customer and supplier should have the best interest of the end user in mind.

PARTNERING

Partnering is a relationship between two or more parties based upon trust, dedication to common goals.

The benefits of partnering are

- ☐ Improved quality
- ☐ Increased efficiency
- ☐ Lower cost
- ☐ Increased opportunity for innovation
- ☐ Continuous improvement

The three key elements to a partnership relationship are

- ☐ Long term commitment
- ☐ Trust
- ☐ Shared Vision

SOURCING

The three types of sourcing are

- ☐ Sole sourcing
- ☐ Multiple sourcing
- ☐ Single sourcing

SUPPLIER SELECTION

The suppliers should be selected with the following ten conditions

1. The supplier should understand clearly the management philosophy of the organization.
2. The supplier should have stable management system.
3. The supplier should maintain high technical standards.
4. The supplier should provide the raw materials and parts which meet quality specifications required by the purchaser.
5. The supplier should have the required capability in terms of production.
6. The supplier should not leak out the corporate secrets.
7. The supplier should quote right price and should meet the delivery schedule. The supplier should be accessible with respect to transportation and communication.
8. The supplier should be sincere in implementing the contract provisions.

9. The supplier should have an effective quality system such as ISO / QS 9000.

10. The supplier should be renowned for customer satisfaction.

SUPPLIER CERTIFICATION :

A certified supplier is one which, after extensive investigation, is found to supply material of such quality that is not necessary to perform routine testing.

The Eight criteria for supplier certification are

1. No product related lot rejections for atleast 1 year.
2. No non-product related rejections for atleast 6 months.
3. No production related negative incidents for atleast 6 months.
4. Should have passed a recent on-site quality system evaluation.
5. Having a fully agreed specifications.
6. Fully documented process and quality system.
7. Timely copies of inspection and test data.
8. Process that is stable and in control.

SUPPLIER RATING :

Supplier Rating is done

- ☐ To obtain an overall rating of supplier performance.
- ☐ To communicate with suppliers regarding their performance.
- ☐ To provide each supplier with a detailed and true record of problems for corrective action.
- ☐ To enhance the relationship between the buyer and the supplier.

RELATIONSHIP DEVELOPMENT :

For establishment of supplier relationship, the following are necessary.

(a) Partnering

(b) Supplier selection

(c) Principles of customer / supplier relations

(d) Certification

(e) Periodic rating

For relationship development, the following are necessary.

(a) Inspection

☐ 100% inspection

☐ Sampling

☐ Audit

☐ Identity check

(b) Training

(c) Teams

(d) Recognition and Reward

PERFORMANCE MEASURES

Performance measures are required for the managers for managing an organization perfectly.

Performance measures are used to achieve the following objectives.

☐ To establish performance measures and reveal trend.

☐ To identify the processes to be improved.

☐ To determine the process gains and losses.

☐ To compare the actual performance with standard performance.

☐ To provide information for individual and team evaluation.

☐ To determine overall performance of the organization.

☐ To provide information for making proper decisions.

WHAT SHOULD BE MEASURED?

HUMAN RESOURCES

1. Lost time due to accidents, absenteeism.

2. Employee turnover.

3. Employee satisfaction index.

4. Training cost per employee.

5. Number of grievances.

CUSTOMERS

1. Number of complaints from customers.

2. Number of on-time deliveries.

3. Warranty data.

4. Dealer satisfaction.

PRODUCTION

2. Inventory.

3. SPC Charts.

4. Amount of scrap / rework.

5. Machine down time.

RESEARCH AND DEVELOPMENT

2. New product time to market.

3. Design change orders.

4. Cost estimating errors.

SUPPLIERS

2. On-time delivery.

3. Service rating.

4. Quality performance.

5. Average lead time.

MARKETING / SALES

2. Sales expense to revenue.

3. New product sales to total sales.

4. New customers.

ADMINISTRATION

1. Revenue per employee.

2. Purchase order error.

3. Billing accuracy.

4. Cost of poor quality.

STRATEGY :

The quality council has the overall responsibility for the performance measures. It ensures that all the measures are integrated into a total system of measures.

A typical system contains the following function

□ Quality

□ Cost

□ Flexibility

□ Reliability

□ Innovation

PERFORMANCE MEASURE PRESENTATION :

There are six basic techniques for presenting performance measures. They are

1. Time series graph.

2. Control charts.

3. Capability Index.

4. Taguchi's loss function.

5. Cost of poor quality.

6. Malcolm Baldrige National Quality Award.

In MBNQA, five categories are analyzed. They are

a) Manufacturing

b) Service

- c) Small business
- d) Health care
- e) Education

UNIT- II

TQM PRINCIPLES

PART – A (2 MARKS)

1. What is a mission statement?
2. What is a vision statement?
3. What are the important factors that influenced purchases?
4. Give the need for a feedback in an organization?
5. List the tools used for feedback?
6. What are the activities to be done using customer complaints?
7. What are the elements of customer service?
8. Define Customer Retention?
9. Define Employee Involvement?

10. State Maslow" s Hierarchy of Needs?
11. State Frederick Herzberg" s Two-factor theory?
12. What does an employee want?
13. What are the concepts to achieve a motivated work force?
14. Define Empowerment?
15. What are the three conditions necessary to create the empowered environment?
16. What are the types of teams?
17. What are the characteristics of successful teams?
18. What are the decision-making methods?
19. What are the stages of team development?
20. Give some common team problems?
21. What are the common barriers to team progress?
22. Give the steps involved in training process?

23. Define Recognition and Reward?
24. What are the types of appraisal formats?
25. What are the benefits of employee involvement?
26. What are the basic ways for a continuous process improvement?
27. What are the three components of the Juran Trilogy?
28. What are the steps in the PDSA cycle?
29. What are the phases of a Continuous Process Improvement Cycle?
30. Define 5S?
31. What is a Kaizen?
32. What are the three key elements to a partnering relationship?
33. What are the three types of sourcing?
34. What are the ten conditions for the selection and evaluation of suppliers?
35. What are the characteristics used to measure the performance of a particular process?
36. Give the six basic techniques for presenting performance measures
37. Give the usage of an effective recognition and reward system?
38. How will you improve the performance appraisal system?
39. What are the typical measurements frequently asked by managers and teams?

PART – B

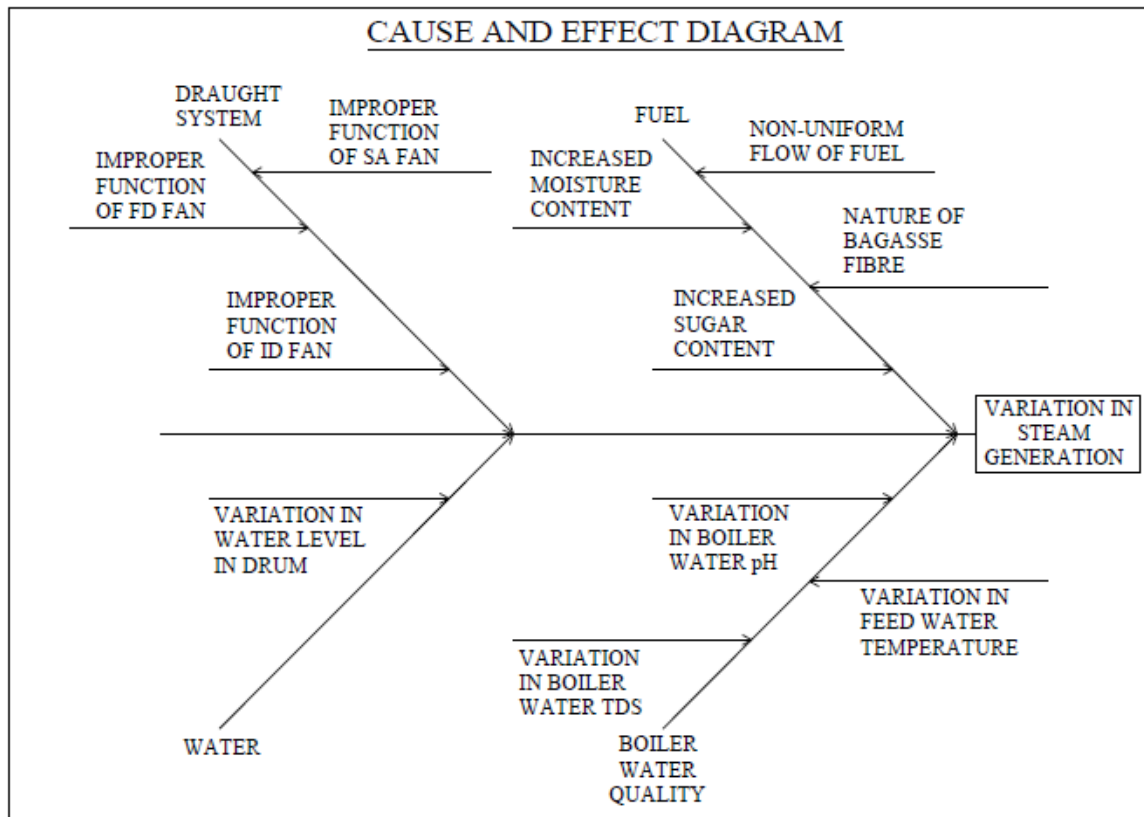
1. Explain Juran trilogy for Continuous Process Improvement? (16)
2. Explain the PDSA cycle? (16)
3. Explain Kaizen principle? (16)
4. Explain how the employee will be involved in doing a process? (16)

UNIT III – STATISTICAL PROCESS CONTROL

TQM TOOLS (SEVEN TOOLS OF QUALITY)

1. PARETO DIAGRAM

2. FLOW DIAGRAM



CAUSE AND EFFECT DIAGRAM

STEPS IN CONSTRUCTING A CAUSE & EFFECT DIAGRAM :

- Define the problem or effect to be analyzed.
- Form the team to perform the analysis. Often the team will uncover potential causes through brainstorming.
- Draw the effect box and the centerline.
- Specify the major potential cause categories and join them as boxes connected to the centerline.

- e. Identify the possible causes and classify them into the categories in step d. Create new categories, if necessary.
- f. Rank order the causes to identify those that seem most likely to impact the problem.
- g. Take corrective action

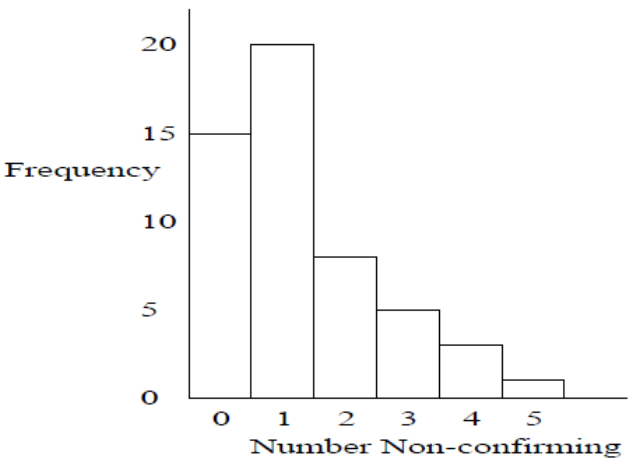
4. CHECK SHEETS

CHECK SHEET						
Product : Bicycle						
Nonconformity Type	Check					Total
Blister	III	III	III	III	I	21
Light spray		III	III	III		15
Drips		III	III	III	III	25
Others		III	III	III	III	25
-----TOTAL						86

5. **HISTOGRAM**

NUMBER OF ERRORS								TALLY OF NUMBER OF ERRORS					
ERRORS													

0	1	3	0	1	0	1	0	Number Non	Tabulation	Freq.			
1	5	4	1	2	1	2	0	-conforming					
1	0	2	0	0	2	0	1	-----					
2	1	1	1	2	1	1		0	III	III	III	15	
0	4	1	3	1	1	1		1	III	III	III	III	20
1	3	4	0	0	0	0		2	III	III	8		
1	3	0	1	2	2	3		3	III	5			
-----								4	III	3			
								5	I	1			



7. SCATTER DIAGRAM

In scatter diagram, three types of co-relations exist.

1. Positive correlation.
2. Negative correlation.
3. No correlation.

NEW MANAGEMENT TOOLS

1. WHY, WHY

2. FORCED FIELD ANALYSIS

- ☐ Define the objective.
- ☐ Determine criteria for evaluating the effectiveness of the improvement action.
- ☐ Brainstorm the forces.
- ☐ Prioritize the forces from greatest to least.
- ☐ Take action.

Objective : Stop Smoking

PROMOTING FORCES

INHIBITING FORCES

Poor Health
Smelly Clothing
Poor Example
Cost
Impact on Others

Habit
Addiction
Taste
Stress
Advertisement

3. NOMINAL GROUP TECHNIQUE

4. AFFINITY DIAGRAM
5. INTER-RELATIONSHIP DIGRAPH
6. TREE DIAGRAM
7. MATRIX DIAGRAM
8. PRIORITIZATION MATRICES
9. PROCESS DECISION PROGRAM CHART
10. ACTIVITY NETWORK DIAGRAM

STATISTICAL FUNDAMENTALS

Statistics is defined as the science that deals with the collection, tabulation, analysis, interpretation and presentation of quantitative data.

Data collected for quality control purposes are obtained by direct observation and are classified as

1. Variables (Measurable quality characteristics like length measured in metres)
2. Attributes (Quality characteristic which are classified as either **conforming** (or) **non-conforming** to specifications, such as “go & no-go” gauge.

MEASURES OF CENTRAL TENDENCY AND DISPERSION

There are two important analytical methods of describing a collection of data as

1. Measures of central tendency.
2. Measures of dispersion.

A measure of central tendency of a distribution is a numerical value that describes how the data tend to build up in the centre. There are three measures in quality as

1. Average
2. Median
3. Mode

Average is the sum of observations divided by the number of observations.

$$\text{Average} = \bar{X} = \frac{\sum_{i=1}^n X_i}{n}$$

where, n = number of observations
 X_i = observed value

Median is the value which divides a series of ordered observations so that the number of items above it is equal to the number of items below it.

Mode is the value which occurs with the greatest frequency in a set of numbers. Mode can again classified as

- ☐ No mode
- ☐ Uni mode
- ☐ Bi mode
- ☐ Multimode

Measure of dispersion describes how the data are spread out on each side of the central value.

The two measures of dispersion are

1. Range
2. Standard Deviation

Range is the difference between the largest and smallest values of observations in a series of numbers.

$$\text{Range} = R = X_h - X_l$$

Where, R = Range

X_h = highest observation in a series

X_l = lowest observation in a series

Standard Deviation measures the spreading tendency of the data. Larger the standard deviation, greater the variability of data.

$$S = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n - 1}}$$

where S = sample standard deviation

X_i = observed value

n = number of observations

POPULATION AND SAMPLE

In order to construct a frequency distribution of the outer diameter of shafts, a small portion (or) sample is selected to represent all the shafts. The population is the whole collection of shafts.

The population may be an hour's production, a week's production, 10000 pieces and so on.

It is not possible to measure all of the population. Hence, we go for sampling. Sampling becomes necessary

1. When it is impossible to measure the entire population.
2. When it is more expensive to observe all the data.
3. When the required inspection destroys the product.
4. When a test of the entire population may be too dangerous as in the case of new medical drug.

\bar{X} is for sample average or sample mean.

μ is for population mean.

S is for sample standard deviation.

σ is for population standard deviation

NORMAL CURVE

Normal curve is common type of population. The normal curve is symmetrical, unimodal, bell – shaped distribution with the mean, median and mode all having the same value.

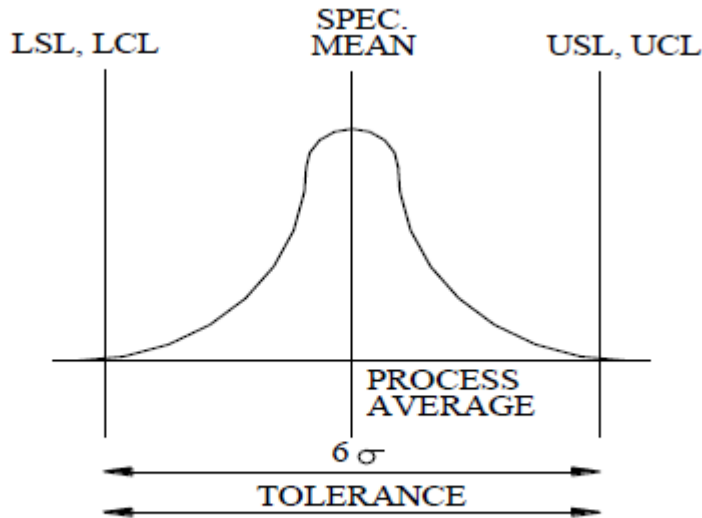


Figure 3.2 : Normal curve tolerance limits

CONTROL CHARTS FOR VARIABLES AND ATTRIBUTES

Variation is a law of nature because no two natural items in any category are the same. Variations are due to the following reasons.

1. Chance causes or Natural causes.
2. Assignable causes.

Chance causes of variation are inevitable. Chance causes affect almost every production process and are inherent in the process. They are purely random, unidentifiable sources of variations.

Hence, when only chance causes are present in a process, the process is said to be in Statistical Control.

Assignable causes result in unnatural variations

The sources of variations may be due to

- Equipments

- ☐ Materials
- ☐ Environment
- ☐ Operator etc.

The **Control chart** is used to look at variations, seek assignable causes and chance causes.

The control chart is a line chart with control limits.

All control charts have three basic components.

1. A centre line, usually the mathematical average of all the samples plotted.
2. Upper and Lower Control Limits that define the constraints of common cause variations.
3. Performance data plotted over time.

A typical control chart is a graphic display of a quality characteristic that has been measured or computed from a **sample** versus **sample number** or **time**. If the process is in control, nearly all of the sample points will fall between **Upper Control Limit (UCL)** and **Lower Control Limit (LCL)**.

CONTROL CHART FOR VARIABLES

1. Mean chart – X chart & Range Chart – R Chart

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

Where, N = Total number of observations.

$$R = \frac{\sum R}{N}$$

n = Sample size (for finding out the value of A₂ and D₄ and D₃ from the table)

Control limits for the charts are given by the following equation.

<u>X - CHART</u>		<u>R - CHART</u>	
CL	$= \bar{X}$	CL	$= \bar{R}$
UCL \bar{X}	$= \bar{X} + A_2 \cdot R$	UCL R	$= D_4 \cdot R$
LCL \bar{X}	$= \bar{X} - A_2 \cdot R$	LCL R	$= D_3 \cdot R$

2. Mean chart - X chart & Standard Deviation chart - S Chart

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

Where, N = Total number of observations.

$$S = \frac{\sum S}{N}$$

n = Sample size (for finding out the value of A_3 and B_4 and B_3 from the table)

Control limits for the charts are given by the following equation.

X - CHART

S - CHART

$$\text{CL} = \bar{\bar{X}}$$

$$\text{UCL}_{\bar{X}} = \bar{\bar{X}} + A_3 \cdot S$$

$$\text{LCL}_{\bar{X}} = \bar{\bar{X}} - A_3 \cdot S$$

$$\text{CL} = \bar{S}$$

$$\text{UCL}_S = B_4 \cdot S$$

$$\text{LCL}_S = B_3 \cdot S$$

CONTROL CHART FOR ATTRIBUTES

1. p chart
2. np chart
3. c chart
4. u chart

PROCESS CAPABILITY INDEX (CP , CPK)

These calculators compute the process capability index which shows the process potential of meeting the specifications. Enter the process parameters and specifications in one of the following tables, depending on whether you have a double-sided or single-sided specification

POPULATION AND SAMPLE

- ☐ The major use of inferential statistics is to use information from a **sample** to infer something about a **population**.
- ☐ A **population** is a collection of data whose properties are analyzed. The population is the *complete* collection to be studied, it contains *all* subjects of interest.
- ☐ A **sample** is a *part* of the population of interest, a sub-collection selected from a population

Population: the universal set of all objects under study.

Sample: Any subset of the population.

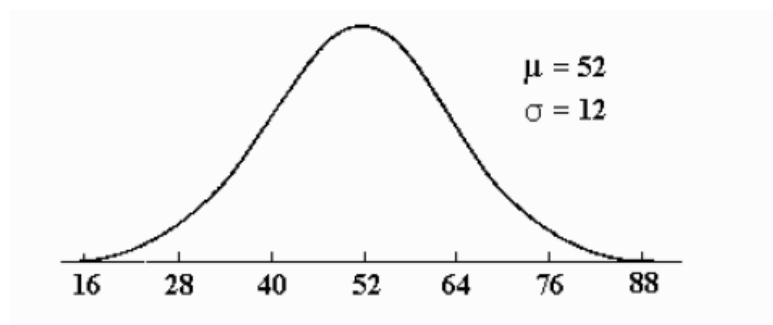
NORMAL CURVE

As discussed in the previous chapter, the normal curve is one of a number of possible models of probability distributions. Because it is widely used and an important theoretical tool, it is given special status as a separate chapter.

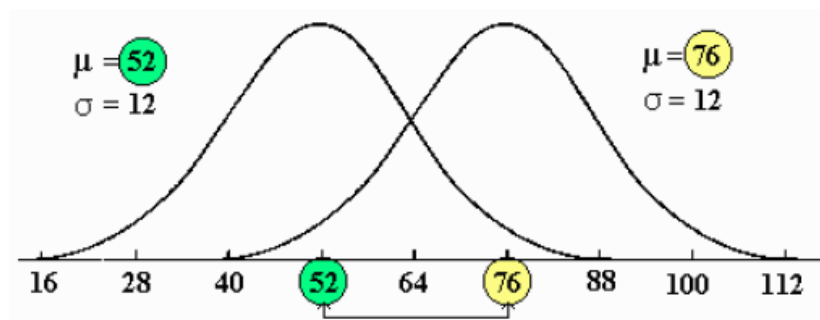
The normal curve is not a single curve, rather it is an infinite number of possible curves, all described by the same algebraic expression:

$$p(X) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(X-\mu)^2}{2\sigma^2}}$$

DRAWING A MEMBER OF THE FAMILY OF NORMAL CURVES



DIFFERENCES IN MEMBERS OF THE FAMILY OF NORMAL CURVES



THE SIX STEPS TO SIX SIGMA.

STEP #1 - IDENTIFY THE PRODUCT YOU CREATE OR THE SERVICE YOU PROVIDE

In other words ... WHAT DO YOU DO?

STEP #2 - IDENTIFY THE CUSTOMER(S) FOR YOUR PRODUCT OR SERVICE, AND DETERMINE WHAT THEY CONSIDER IMPORTANT I.E. CUSTOMER REQUIREMENTS

In other words ... WHO USES YOUR PRODUCT AND SERVICES?

STEP #3 - IDENTIFY YOUR NEEDS (TO PROVIDE PRODUCT/SERVICE SO THAT IT SATISFIES THE CUSTOMER)

In other words ... WHAT DO YOU NEED TO DO YOUR WORK?

STEP #4 - DEFINE THE PROCESS FOR DOING YOUR WORK

In other words ... HOW DO YOU DO YOUR WORK?

STEP #5 - MISTAKE-PROOF THE PROCESS AND ELIMINATE WASTED EFFORTS USING...

In other words ... HOW CAN YOU DO YOUR WORK BETTER?

Step #6 - Ensure continuous improvement by measuring, analyzing and controlling the improved process using control charts

UNIT- III

STATISTICS PROCESS CONTROL

PART – A (2 MARKS)

- 1 Define Statistics?
2. What is a measure of central tendency?
3. What is Measures of dispersion?
4. What is a normal curve?
5. What is the use of the control chart?

6. Give the objectives of the attribute charts?
7. Define Six Sigma Problem Solving Method?
8. What are the new seven management tools?
9. Give the seven tools of quality?
10. Give the usage of C&E diagrams?
11. Define Six Sigma?
12. What are the various histogram shapes?
13. Differentiate Population & Sample?
14. Give the sources of variation?
15. Define Run chart?
16. Define Control chart?
17. What are the various patterns of scatter diagrams?
18. What is the procedure for constructing the tree diagram?
19. Give at least five standard formats of matrix diagram?
20. What are the benefits of an activity network diagram?

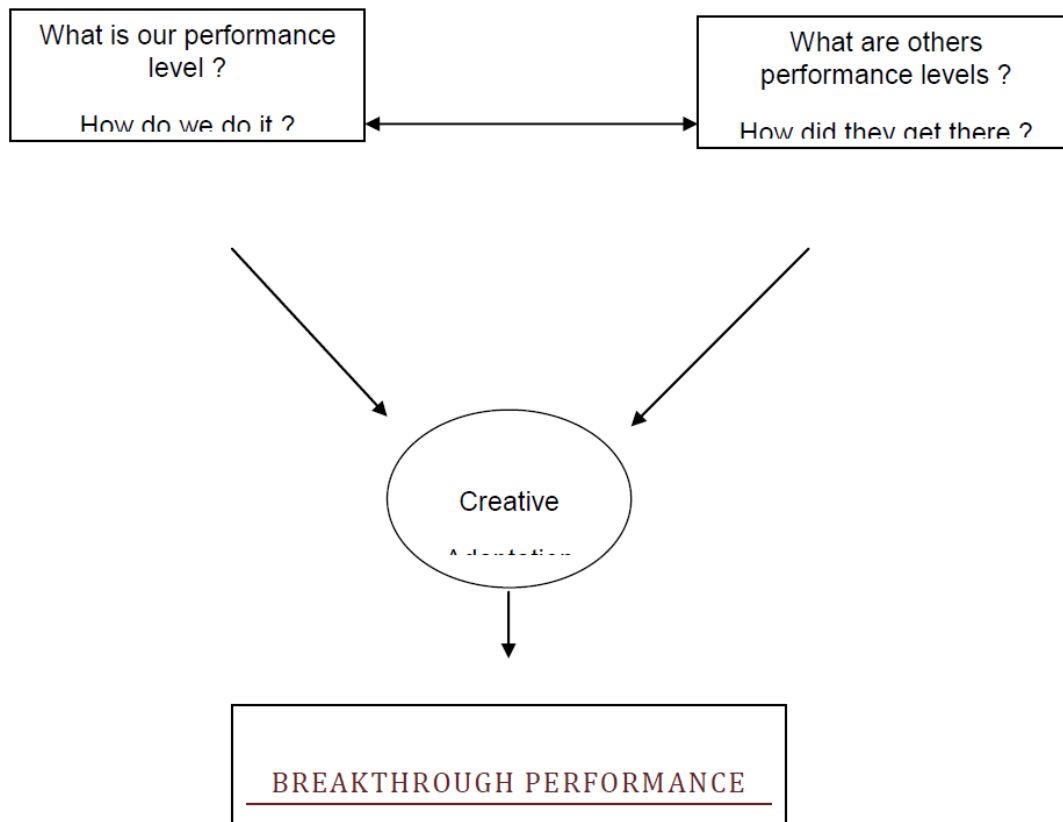
PART – B

1. Explain the QC or SPC tools? (16)
2. Explain the Seven Management Tools? (16)
3. Plot the control chart for variables and attributes (16)
4. Explain the concepts of Six Sigma? (16)

BENCHMARKING

- Benchmarking is a systematic method by which organizations can measure themselves against the best industry practices.
- Benchmarking is a systematic search for the best practices, innovative ideas, and highly effective operating procedures.

BENCHMARKING CONCEPT



REASONS TO BENCHMARK:

- It is a tool to achieve business and competitive objectives
- It can inspire managers (and Organizations) to compete
- It is time and cost effective
- It constantly scans the external environment to improve the process
- Potential and useful technological breakthroughs can be located and adopted early

PROCESS OF BENCHMARKING

The following six steps contain the core techniques of Benchmarking

1. Decide what to benchmark

- Benchmarking can be applied to any business or production process
- The strategy is usually expressed in terms of mission and vision statements
- Best to begin with the mission and critical factors
- Choosing the scope of the Benchmarking study
- Pareto analysis – what process to investigate
- Cause and Effect diagram – for tracing outputs back

2. Understand current performance

- Understand and document the current process
- Those working in the process are the most capable of identifying and correcting problems
- While documenting, it is important to quantify
- Care should be taken during accounting information

3. Plan

- A benchmarking team should be chosen
- Organizations to serve as the benchmark need to be identified
- Time frame should be agreed upon for each of the benchmarking tasks
- There are three types of benchmarking

a. Internal

b. Competitive

c. Process

4. Study Others

Benchmarking studies look for two types of information

- How best the processes are practiced
- Measurable results of these practices

Three techniques for conducting the research are

- Questionnaires
- Site visits
- Focus groups

5. Learn from the data

Answering a series of questions like

- Is there a gap between the organization's performance and the performance of the best-in-class organizations?
- What is the gap? How much is it?
- Why is there a gap? What does the best-in-class do differently that is better?
- If best-in-class practices were adopted, what would be the resulting improvement?
- Benchmarking studies can reveal three different outcomes
- Negative gap
- Parity
- Positive gap

6. Using the findings

The objective is to close the gap. For this

- Findings must be communicated to the people within the organization
- Action plans must be developed to implement new processes

Groups that must agree on the change

- Process owners
- Upper management

Steps for the development and execution of action plans are

1. Specify tasks
2. Sequence tasks
3. Determine resources needs
4. Establish task schedule
5. Assign responsibility for each task
6. Describe expected results
7. Specify methods for monitoring results

PITFALLS AND CRITICISMS OF BENCHMARKING :

- Idea of copying others
- It is not a cure or a business philosophy
- Some process have to be benchmarked repeatedly
- It is not a substitute for innovation

QUALITY FUNCTION DEPLOYMENT

- Quality Function Deployment is a planning tool used to fulfill

customer expectations.

- Quality Function Deployment focuses on customer expectations or requirements, often referred to as voice of the customer.

QFD TEAM :

There are two types of teams namely

1. Team for designing a new product
3. Team for improving an existing product

BENEFITS OF QFD :

1. Improves Customer satisfaction

- ☐ Creates focus on customer requirements
- ☐ Uses competitive information effectively
- ☐ Prioritizes resources
- ☐ Identifies items that can be acted upon

2. Reduces Implementation Time

- ☐ Decreases midstream design changes
- ☐ Limits post introduction problems
- ☐ Avoids future development redundancies

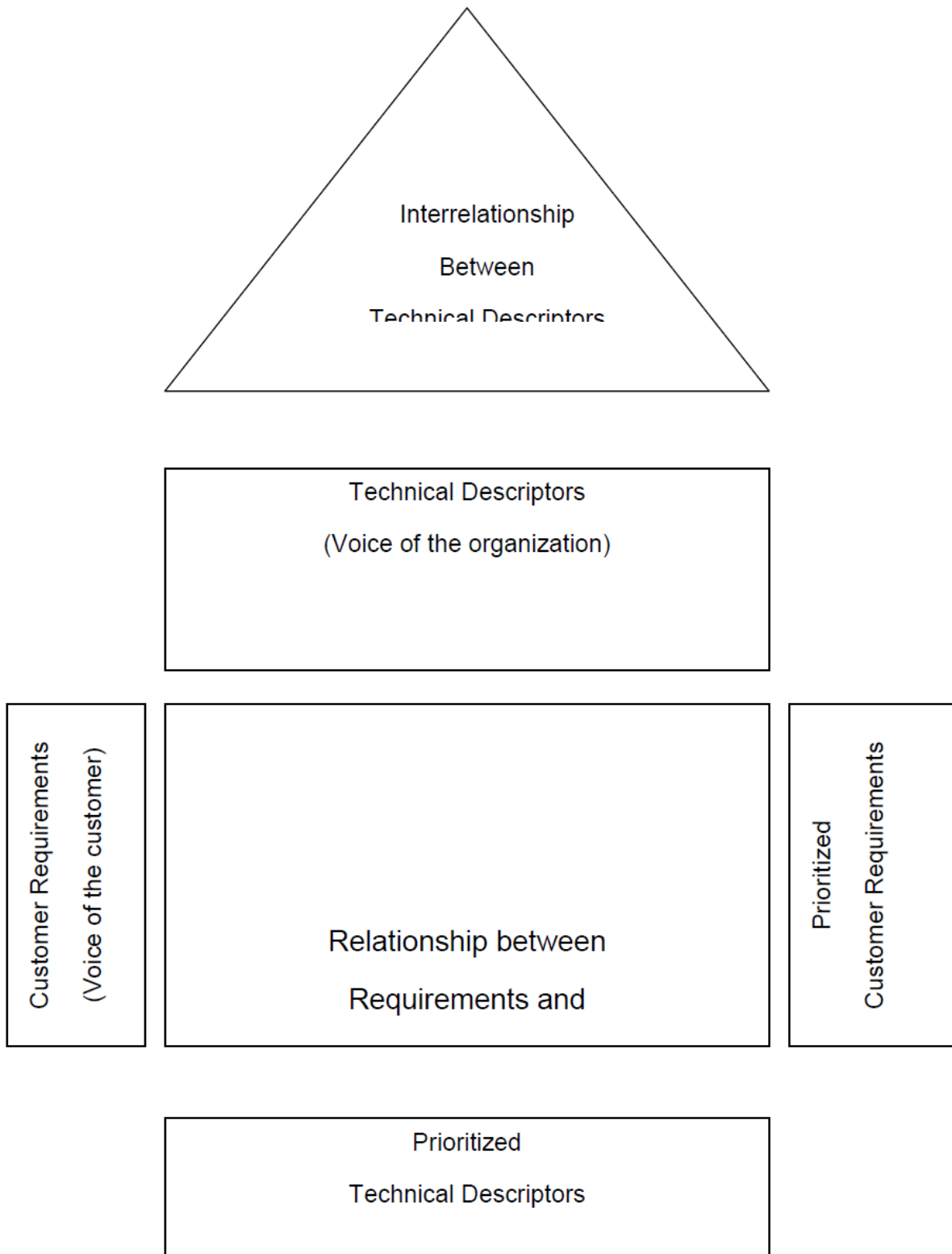
3. Promotes Team Work

- ☐ Based on consensus
- ☐ Creates communication
- ☐ Identifies actions

4. Provides Documentation

- ☐ Documents rationale for design
- ☐ Adds structure to the information
- ☐ Adapts to changes (a living document)

HOUSE OF QUALITY :



THE STEPS IN BUILDING A HOUSE OF QUALITY ARE :

1. List Customer Requirements (WHAT"s)
2. List Technical Descriptors (HOW"s)
3. Develop a Relationship Matrix Between WHAT"s and HOW"s
4. Develop an Inter-relationship Matrix between HOW"s
5. Competitive Assessments
 - a. Customer Competitive Assessments
 - b. Technical Competitive Assessments
6. Develop Prioritized Customer Requirements
7. Develop Prioritized Technical Descriptors

TAGUCHI'S QUALITY LOSS FUNCTION

Taguchi"s Quality Loss Function concept combines cost, target and variation in one metric with specifications being of secondary importance.

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

Societal losses include failure to meet customer requirements, failure to meet ideal performance and harmful side effects.

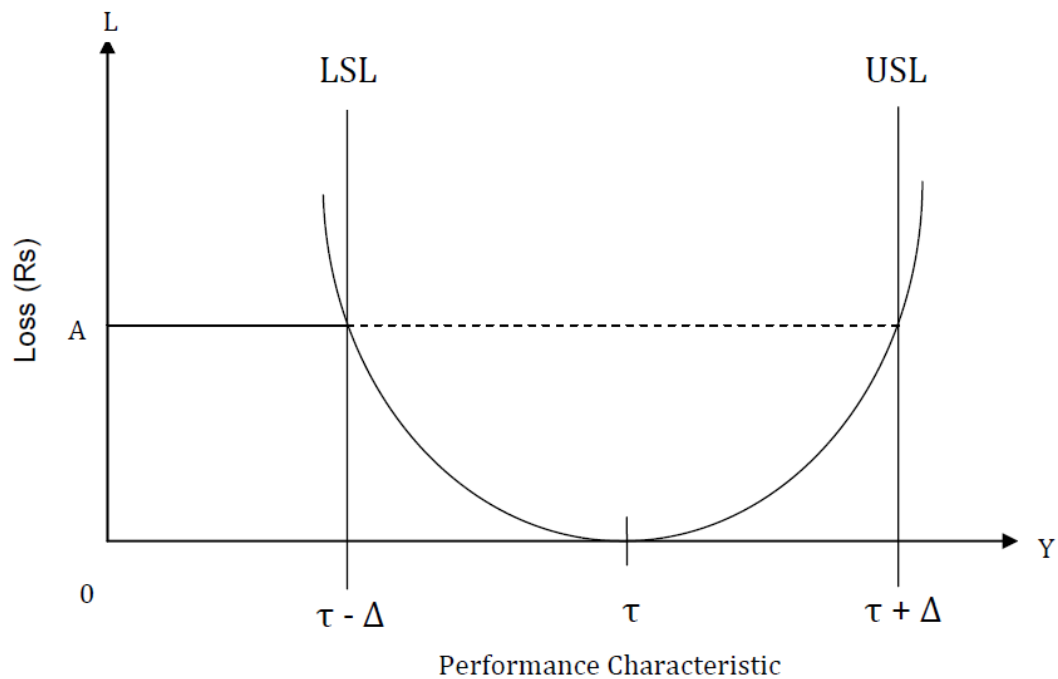
CUSTOMERS PERCEIVE QUALITY AS MEETING THE TARGET RATHER THAN JUST MEETING THE SPECIFICATIONS.

There are three common quality loss functions

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

NOMINAL – THE – BEST :

Although Taguchi developed so many loss functions, many situations are approximated by the quadratic function which is called the **Nominal – the – best** type.



The quadratic function is shown in figure. In this situation, the loss occurs as soon as the performance characteristic, y , departs from the target τ .

At τ , the loss is Rs. 0.

At LSL (or) USL, the loss is Rs. A .

The quadratic loss function is described by the equation $L = k (y - \tau)^2$.

Where,

L = cost incurred as quality deviates from the target.

y = Performance characteristic

τ = target

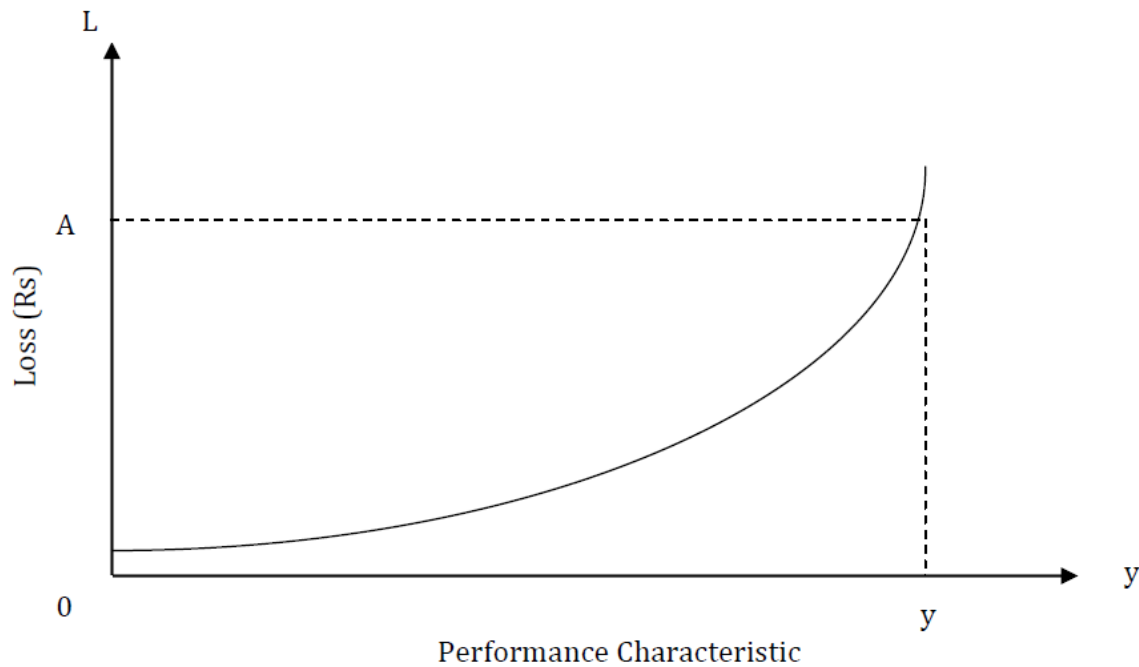
k = Quality loss coefficient.

The loss coefficient is determined by setting $\Delta = (y - \tau)$, the deviation from the target. When Δ is the USL (or) LSL, the loss to the customer of repairing (or) discarding the product is Rs. A .

Thus,

$$K = A / (y - \tau)^2 = A / \Delta^2 .$$

SMALLER – THE – BETTER :



The following figure shows the smaller – the – better concepts.

The target value for **smaller – the – better** is 0. There are no negative values for the performance characteristic.

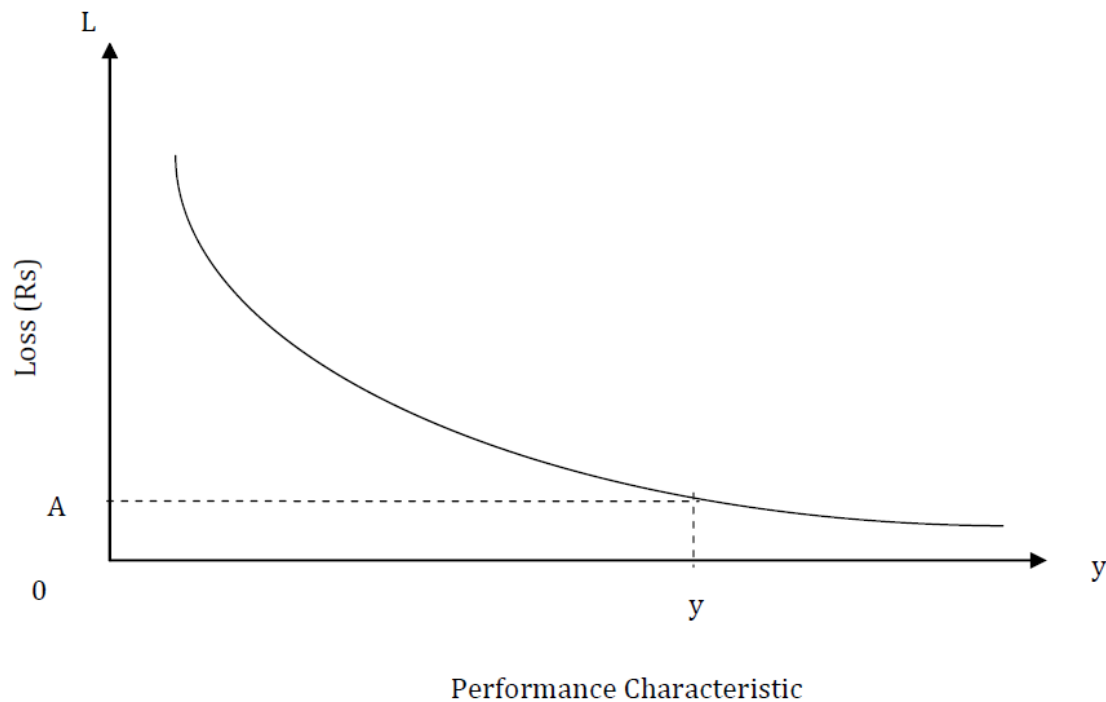
The radiation leakage from a microwave appliance, the response time for a computer, pollution from an automobile, out of round for a hole etc. are the performance characteristics for this concept.

LARGER – THE – BETTER :

The following figure shows the concept of the Larger – the – better.

In the Larger – the – better concept, the target value is ∞ (infinity), which gives a **zero loss**.

There are no negative values and the worst case is at $y = 0$. Actually, larger – the – better is the reciprocal of smaller – the – better. The performance characteristics in Larger – the – better are bond strength of adhesives, welding strength etc.



TOTAL PRODUCTIVE MAINTENANCE (TPM)

Total Productive Maintenance (TPM) is defined as keeping the running plant and equipment at its highest productive level with the co-operation of all areas of the organization.

Predictive and Preventive maintenance are essential to building a foundation for a successful TPM environment. **Predictive Maintenance** is the process of using data and statistical tools to determine when a piece of equipment will fail. **Preventive Maintenance** is the process of periodically performing activities such as lubrication on the equipment to keep it running.

OBJECTIVES OF TPM :

1. To maintain and improve equipment capacity.
2. To maintain equipment for life.
3. To use support from all areas of the operation.
4. To encourage input from all employees.
5. To use teams for continuous improvement.

TPM PHILOSOPHY – CONCEPT OF TPM :

Total Productive Maintenance (TPM) is an extension of the Total Quality Management (TQM) philosophy to the maintenance function.

TPM has the following steps:

1. Management should learn the new philosophy of TPM.
2. Management should promote the new philosophy of TPM.
3. Training should be funded and developed for everyone in the organization.
4. Areas of needed improvement should be identified.

Loss measurements to identify improvement needs are

- ☐ Down time losses

☐ Reduced speed losses

☐ Poor quality losses

5. Performance goals should be formulated.

6. An implementation plan should be developed.

7. Autonomous work groups should be established.

FAILURE MODE AND EFFECTS ANALYSIS

FMEA is an analytical technique that combines the technology and experience of people in identifying foreseeable failure modes of a product or process and planning for its elimination.

It is a group of activities comprising the following :

1. Recognize the potential failure of a product or process.

2. Identify actions that eliminate / reduce the potential failure.

3. Document the process.

Two important types of FMEA are

☐ Design FMEA

☐ Process FMEA

INTENT OF FMEA :

☐ Continually measuring the reliability of a machine, product or process.

☐ To detect the potential product - related failure mode.

☐ FMEA evaluation to be conducted immediately following the design phase.

BENEFITS OF FMEA:

☐ Having a systematic review of components failure modes to ensure that any failure produces minimal damage.

☐ Determining the effects of any failure on other items.

☐ Providing input data for exchange studies.

☐ Determining how the high-failure rate components can be adapted to high-reliability components.

☐ Eliminating / minimizing the adverse effects that failures could generate.

☐ Helping uncover the misjudgements, errors etc.

☐ Reduce development time and cost of manufacturing.

FMEA TEAM :

Engineers from

- Assembly - Manufacturing - Materials - Quality - Service - Supplier - Customer

FMEA DOCUMENTATION :

The purpose of FMEA documentation is

☐ To allow all involved Engineers to have access to others thoughts

□ To design and manufacture using these collective thoughts (promotes team approach) **UNIT-**

IV

TQM TOOLS

PART – A (2 MARKS)

1. Define Benchmarking?
2. Enumerate the steps to benchmark?
3. What are the types of benchmarking?
4. What is a QFD?
5. What are the benefits of QFD?
6. What are the steps required to construct an affinity diagram?
7. What are the parts of house of quality?
8. How will you build a house of quality?
9. Define FMEA?
10. What are the stages of FMEA?
11. What are the goals of TPM?
12. Give the seven basic steps to get an organization started toward TPM?
13. What are the major loss areas?
14. What are the generic steps for the development and execution of action plans in benchmarking?
15. What are the phases of QFD process?
16. What are the several types of FMEA?
17. Define TPM?

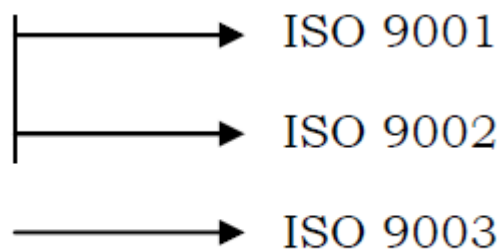
PART – B

1. Explain the Bench marking Process and reasons to Benchmark? (16)
2. Explain the QFD process? (16)
3. Explain the House of Quality in Quality Function Deployment? (16)
4. What is FMEA? Explain the stages of FMEA? (16)

UNIT V – QUALITY SYSTEMS
ISO 9000 STANDARDS



ISO 9000



ISO 9001

Design, Development, Production, Installation & Servicing

ISO 9002

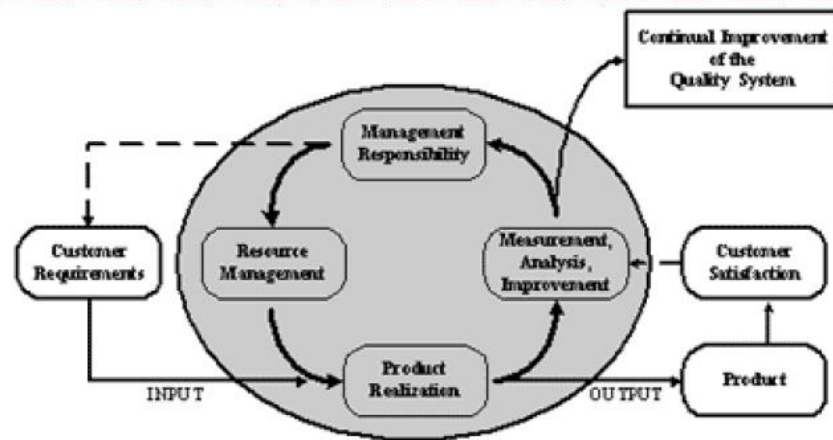
Production, Installation & Servicing

ISO 9003

Inspection & Testing

ISO 9004

Provides guidelines on the technical, administrative and human factors affecting the product or services



ISO 9000: 2000 Sector Standard

BENEFITS OF ISO 9000 STANDARDS:

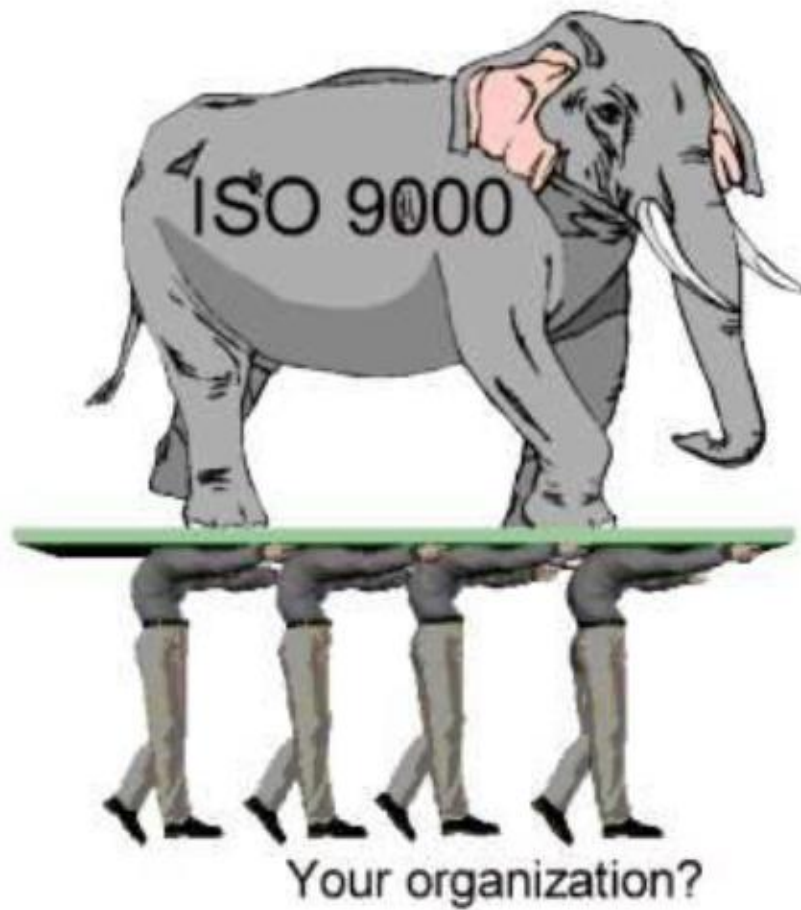
☐ Achievement of international standard of quality.

☐ Value for money.

Customer satisfaction.

☐ Higher productivity.

- ☐ Increased profitability
- ☐ Improved corporate image
- ☐ Access to global market
- ☐ Growth of the organization
- ☐ Higher morale of employees



CLAUSES (ELEMENTS) OF ISO 9000 (DURING THE YEAR 1987)

4.1 Management Responsibility

- ☐ Adequate resources for the verification activities
- ☐ Need for trained personnel
- ☐ Work and verification activities including audits
- ☐ A Management Representative to be identified

☐ Review the Quality System performance and customer complaints periodically

4.2 Quality System

4.3 Contract review

4.4 Design Control

4.5 Documents Control

4.6 Purchasing

4.7 Purchaser – Supplied

4.8 Product Identification and Traceability

4.9 Process Control

4.10 Inspection and Testing

4.11 Inspection Measuring and Test Equipment

4.12 Inspection and Test Status

4.13 Control of Non – Conforming Product

4.14 Corrective Action

4.15 Handling, Storage, Packaging and Delivery

4.16 Quality Records

4.17 Internal Quality Audits

4.18 Training

4.19 Servicing

4.20 Statistical Techniques



CLAUSES (ELEMENTS) OF ISO 9000 (During the year 2000)

1. Scope

2. Normative Reference

3. Terms and Definitions

4. Quality Management System (QMS)

General Requirements

Documentation

5. Management Responsibility

Management Commitment

Customer Focus

Quality Policy

Planning

Responsibility, Authority and Communication

Management Review

6. Resource Management

Provision of Resources

Human Resources

Infrastructure

Work Environment

7. Product Realization

Planning of Product Realization

Customer related processes

Design and Development

Purchasing

Production and Service Provision

Control of Monitoring and Measuring devices

8. Monitoring and Measurement

General

Monitoring and Measurement

Control of Non-Conforming Product

Analysis of Data

Improvement

IMPLEMENTATION OF QUALITY MANAGEMENT SYSTEM :

1. Top 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

PITFALLS OF SUCCESSFUL IMPLEMENTATION:

1. Using a generic documentation program or another organization's documentation program
2. Over-documentation or documentation that is too complex
3. Using External Consultants without involvement
4. Neglecting to obtain top management's involvement
5. Developing a system that does not represent what actually occurs

DOCUMENTATION

In every organization, the quality system must be documented properly. The documentation of the system can be seen as a hierarchical format as shown.

1 POLICY

2 PROCEDURES

3 PRACTICES

4 PROOFS

QUALITY AUDITING

The term Audit refers to a regular examination and checking of accounts or financial records, settlement or adjustment of accounts.

It also refers to checking, inspection and examination of Production Processes.

PURPOSE OF QUALITY AUDIT:

- ☐ To establish the adequacy of the system.
- ☐ To determine the effectiveness of the system.
- ☐ To afford opportunities for system analysis.
- ☐ To help in problem solving.
- ☐ To make decision making easier etc.

TYPES OF QUALITY AUDIT :

1. First – Party Audit.
2. Second – Party Audit.
3. Third – Party Audit.

Quality audit can also be classified on the basis of the area taken into account for the audit such as

- ☐ System Audit.
- ☐ Process Audit.
- ☐ Product Audit.
- ☐ Adequacy Audit.
- ☐ Compliance Audit.

ISO 14000 – ENVIRONMENTAL MANAGEMENT SYSTEM

The overall aim of the Environmental Management systems is **to provide protection to the environment and to prevent pollution.**

- ☐ The success of ISO 9000 along with increased emphasis on Environmental issues were instrumental in ISO's decision to develop Environmental Management Standards.
- ☐ In 1991, ISO formed the Strategic Advisory Group on the Environment (SAGE) which led to the formation of Technical Committee (TC) 207 in 1992.
- ☐ Mission of TC207 is to develop standards for an Environmental Management System (EMS) which was identified as ISO 14000.
- ☐ TC 207 has Established six sub-committees
 1. Environmental Management System (EMS)
 2. Environmental Auditing (EA)
 3. Environmental labeling (EL)
 4. Environmental Performance Evaluation (EPE)
 5. Life-Cycle Assessment (LCA)
 6. Terms & Definitions

Environmental Management System (EMS) :

EMS has two Evaluation Standards. They are

1. Organization Evaluation Standards
2. Product Evaluation Standards

REQUIREMENT OF ISO 14001

There are six elements

1. GENERAL REQUIREMENTS

- ☐ EMS should include policy, planning implementation & operation, checking & corrective action, management review.

2. ENVIRONMENTAL POLICY (Should be based on mission)

- ☐ The policy must be relevant to the organization's nature.
- ☐ Management's Commitment (for continual improvement & preventing pollution).
- ☐ Should be a framework (for Environmental objectives & Targets).
- ☐ Must be Documented, Implemented, & Maintained.

3. PLANNING

- ☐ Environmental Aspects
- ☐ Legal & other Requirements
- ☐ Objectives & Targets
- ☐ Environmental Management Programs

4. IMPLEMENTATION & OPERATION

- ☐ Structure & Responsibility
- ☐ Training, Awareness & Competency
- ☐ Communication
- ☐ EMS Documentation
- ☐ Document Control
- ☐ Operational Control
- ☐ Emergency Preparedness & Response

5. CHECKING & CORRECTIVE ACTION

- ☐ Monitoring & Measuring
- ☐ Nonconformance & Corrective & Preventive action
- ☐ Records
- ☐ EMS Audit

6. MANAGEMENT REVIEW

- ☐ Review of objectives & targets
- ☐ Review of Environmental performance against legal & other requirement
- ☐ Effectiveness of EMS elements
- ☐ Evaluation of the continuation of the policy

BENEFITS OF ENVIRONMENTAL MANAGEMENT SYSTEM :

GLOBAL BENEFITS

- ☐ Facilitate trade & remove trade barrier
- ☐ Improve environmental performance of planet earth
- ☐ Build consensus that there is a need for environmental management and a common terminology for EMS

ORGANIZATIONAL BENEFITS

- ☐ Assuring customers of a commitment to environmental management
- ☐ Meeting customer requirement
- ☐ Improve public relation
- ☐ Increase investor satisfaction
- ☐ Market share increase
- ☐ Conserving input material & energy
- ☐ Better industry/government relation
- ☐ Low cost insurance, easy attainment of permits & authorization

UNIT- V

QUALITY SYSTEMS

PART – A (2 MARKS)

1. Give the ISO 9000 Series of Standards?
2. What is the need for ISO 9000?
3. Give some other quality systems?
4. Give the objectives of the internal audit?
5. What are the requirements of ISO 14001?
6. What are the benefits of ISO 14000?
7. What are the four elements for the checking & corrective action of ISO 14001?
8. What are the seven elements for the implementation & operations of ISO 14001?
9. What are the four elements for the planning of ISO 14001?
10. Give the types of Organizational Evaluation Standards?
11. Give the types of Product Evaluation Standards?
12. Define Quality Audits?
13. Analyze TQM?
14. What are the benefits of ISO?
15. Give the ISO 9001 requirements?
16. What are the methods of actual audit?
1. Explain the elements of ISO 9000:2000? (16)
2. Explain the implementation and documentation of Quality System? (16)
3. Explain the requirements of ISO 14000? (16)
4. Explain the Benefits of ISO 14000? (16)
5. Discuss about ISO 9000:2000 Quality Systems? (16)
6. Why is ISO 9000 important? Explain briefly. (16)

TWO MARK QUESTIONS-ANSWERS

1. Define Total Quality?

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 management techniques, existing improvement efforts, and technical tools under a disciplined approach.

2. Define Quality?

Quality = Performance x Expectations

3. What are the Dimensions of Quality?

- Performance
- Features
- Conformance
- Reliability
- Durability
- Service
- Response
- Aesthetics
- Reputation

4. Give the Basic Concepts of TQM?

_ A committed and involved management to provide long-term top-to-bottom organizational support.

An unwavering focus on the customer, both internally and externally.

_ Effective involvement and utilization of the entire work force.

Continuous improvement of the business and production process.

Treating suppliers as partners.

_ Establish performance measures for the processes.

5. State Deming Philosophy?

- Create and publish the aims and purposes of the organization.

_ Learn the new philosophy.

- Understand the purpose of inspection.

_ Stop awarding business based on price alone.

_ Improve constantly and forever the system.

_ Institute training.

- Teach and institute leadership.
- _ -Drive out fear, Create trust and Create a climate for innovation.
- _ -Optimize the efforts of teams, groups and staff areas.
- Eliminate exhortations for the work force.
- Eliminate numerical quotas for the work force.
- _ -Eliminate management by objective.
- _ -Remove barriers that rob people of pride of workmanship.
- _Encourage education and self-improvement for everyone.
- _Take action for accomplish the transformation.

6. Give the Principles of TQM?

1. Constancy of purpose: short range and long range objectives aligned
2. Identify the customer(s); Customer orientation
3. Identification of internal and external customers
4. Continuous improvement
5. Workflow as customer transactions
6. Empower front-line worker as leader
7. Quality is everybody"s business
8. For a service industry, some elements of quality are:
 - empathy
 - trust; i.e. expertise, integrity, courtesy
 - responsiveness
 - tangible product attractiveness (curb appeal)
 - reliability, on time, no interruptions
9. Customer orientation to child care services, a marketing perspective
10. Barriers that exist to a customer orientation
11. How do we find out what customers want?
12. Present Art Emlen findings on flexibility

7. Give the Obstacles associated with TQM Implementation?

- _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.

8. Give the Analysis Techniques for Quality Costs?

- i. Trend Analysis
- ii. Pareto Analysis

9. Define Quality Costs?

Quality Costs are defined as those costs associated with the nonachievement of product or service quality as defined by the requirements established by the organization and its contracts with customers and society.

10. Give the primary categories of Quality cost?

- i. Preventive cost category
- ii. Appraisal cost category
- iii. Internal failure cost category
- iv. External failure cost category

11. Give the sub-elements of Preventive cost category?

- i. Marketing/Customer/User
- ii. Product/Service/Design development
- iii. Purchasing
- iv. Operations/
- v. Quality Administration
- vi. Other Prevention Costs

12. Give the sub-elements of Appraisal cost category?

- i. Purchasing appraisal cost
- ii. Operations appraisal cost
- iii. External appraisal cost
- iv. Review of test and application data
- v. Miscellaneous quality evaluations

13. Give the sub-elements of Internal failure cost category?

- i. Product or Service Design costs (Internal)
- ii. Purchasing failure costs
- iii. Operations failure costs

14. Give the sub-elements of External failure cost category?

- i. Complaint investigations of customer or user service
- ii. Returned goods
- iii. Retrofit and recall costs
- iv. Warranty claims
- v. Liability costs
- vi. Penalties
- vii. Customer or user goodwill
- viii. Lost sales
- ix. Other external failure costs

15. Give the typical cost bases?

- i. Labor
- ii. Production
- iii. Unit
- iv. Sales

16. How will you determine the optimum cost?

- a. Make comparison with other organizations
- b. Optimize the individual categories
- c. Analyze the relationships among the cost categories

17. State the Quality Improvement Strategy?

- Reduce failure costs by problem solving
- _Invest in the “right” prevention activities
- _Reduce appraisal costs where appropriate and in a statistically sound manner
- Continuously evaluate and redirect the prevention effort to gain further quality improvement.

18. Define Quality Planning?

A quality plan sets out the desired product qualities and how these are assessed and define the most significant quality attributes. It should define the quality assessment process. It should set out which organizational standards should be applied and, if necessary, define new standards.

19. Give the Objectives of TQM?

- a. To develop a conceptual understanding of the basic principles and methods associated with TQM;
- b. To develop an understanding of how these principles and methods have been put into effect in a variety of organizations;

- c. To develop an understanding of the relationship between TQM principles and the theories and models studied in traditional management;
- d. To do the right things, **right** the first time, every time.

20. Give the Quality Hierarchy?

1. Inspection
2. Quality Control (QC)
3. Quality Assurance (QA)
4. Total Quality Management

Inspect products.

Detection

Finding &

Fixing Mistakes.

21. What is needed for a leader to be effective?

To be effective, a leader needs to know and understand the following:

- _People, paradoxically, need security and independence at the same time.
- People are sensitive to external rewards and punishments and yet are also strongly self-motivated.
- People like to hear a kind word of praise.
- _People can process only a few facts at a time; thus, a leader needs to keep things simple.
- People trust their gut reaction more than statistical data.
- _People distrust a leader`s rhetoric if the words are inconsistent with the leader`s actions.

22. What is the important role of senior management?

- Listening to internal and external customers and suppliers through visits, focus groups and surveys.
- _Communication.
- To drive fear out of the organization, break down barriers, remove system roadblocks, anticipate and minimize resistance to change and in general, change the culture.

23. What are the general duties of a quality council?

- i. Develop, with input from all personnel, the core values, vision statement, mission statement, and quality policy statement.
- ii. Develop the strategic long-term plan with goals and the annual quality

improvement program with objectives.

iii. Create the total education and training plan.

iv. Determine and continually monitor the cost of poor quality.

v. Determine the performance measures for the organization, approve those for the functional areas, and monitor them.

vi. Continually, determine those projects that improve the processes, particularly those that affect external and internal customer satisfaction.

vii. Establish multifunctional project and departmental or work group teams and monitor their progress.

viii. Establish or revise the recognition and reward system to account for the new way of doing business.

24. What does a typical meeting agenda contain after establishing the TQM?

Progress report on teams

Customer satisfaction report

Progress on meeting goals

New project teams

Recognition dinner

Benchmarking report

25. What are the various quality statements?

Vision Statement

Mission Statement

Quality Policy Statement

26. Give the basic steps to strategic quality planning?

i. Customer needs

ii. Customer positioning

iii. Predict the future

iv. Gap analysis

v. Closing the gap

vi. Alignment

vii. Implementation

27. What is a quality policy?

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.

28. What is a mission statement?

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

29. What is a vision statement?

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

30. What are the important factors that influenced purchases?

- i. Performance
- ii. Features
- iii. Service
- iv. Warranty
- v. Price
- vi. Reputation

31. Give the need for a feedback in an organization?

- _Discover customer dissatisfaction.
- _Discover relative priorities of quality.
- _Compare performance with the competition.
- _Identify customer"s needs.
- _Determine opportunities for improvement.

32. List the tools used for feedback?

- A Comment cards
- A Surveys
- A Focus groups
- A Toll-free telephone lines
- A Customer visits
- A Report cards
- A The internet
- A Employee feedback
- A American Customer Satisfaction Index

33. What are the activities to be done using customer complaints?

- # Investigate customer's experience by actively soliciting feedback, both positive and negative, and then acting on it promptly.
- # Develop procedures for complaint resolution that include empowering front-line personnel.
- # Analyze complaints, but understand that complaints that do not always fit into neat categories.
- # Work to identify process and material variations and then eliminate the root cause. "More inspection" is not corrective action.
- # 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.
- # Provide a monthly complain report to the quality council for their evaluation and, if needed, the assignment of process improvement teams.
- # Identify customer's expectations beforehand rather than afterward through complaint analysis.

34. What are the elements of customer service?

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

35. Define customer retention?

Customer retention represents the activities that produce the necessary customer satisfaction that creates customer loyalty, which actually improves the bottom line. It is the nexus between the customer satisfaction and the bottom line.

36. Define Employee Involvement?

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

37. State Maslow's Hierarchy of Needs?

Level 1 : Survival

Level 2 : Security

Level 3 : Social

Level 4 : Esteem

Level 5 : Self-actualization

38. State Frederick Herzberg's Two-factor theory?

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

39. What does an employee want?

- i. Interesting work
- I ii. Appreciation
- iii. Involvement
- iv. Job security
- v. Good pay
- vi. Promotion/growth
- vii. Good working conditions
- viii. Loyalty to employees
- ix. Help with personal problems
- x. Tactful discipline

40. What are the concepts to achieve a motivated work force?

- a. Know thyself
- b. Know your employees
- c. Establish a positive attitude
- d. Share the goals
- e. Monitor progress
- f. Develop interesting work
- g. Communicate effectively
- h. Celebrate success

41. 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 worker at 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 welldefined

boundaries in order to achieve organizational values and goals.

42. What are the three conditions necessary to create the empowered environment?

- i. Everyone must understand the need for change.
- ii. The system needs to change for the new paradigm
- iii. The organization must enable its employees

.

43. What are the types of teams?

- i. Process improvement team
- ii. Cross-functional team
- iii. Natural work teams
- iv. Self-directed/self-managed work teams

44. What are the characteristics of successful teams?

- a. Sponsor
- b. Team charter
- c. Team composition
- d. Training
- e. Ground rules
- f. Clear objectives
- g. Accountability
- h. Well-defined decision procedures
- i. Resources
- j. Trust
- k. Effective problem solving
- l. Open communications
- m. Appropriate leadership
- n. Balanced participation
- o. Cohesiveness

45. What are the decision-making methods?

- a) Nondecision
- b) Unilateral decision
- c) Handclasp decision
- d) Minority-rule decision
- e) Majority-rule decision
- f) Consensus

46. What are the stages of team development?

- i. Forming
- ii. Storming
- iii. Norming
- iv. Performing
- v. Adjourning

47. Give some common team problems?

- I. Floundering
- II. Overbearing participants
- III. Dominating participants
- IV. Reluctant participants
- V. Unquestioned acceptance of opinions as facts
- VI. Rush to accomplish
- VII. Attribution
- VIII. Discounts and “plops”
- IX. Wanderlust : digression and tangents
- X. Feuding team members

48. What are the common barriers to team progress?

- i. Insufficient training
- ii. Incompatible rewards and compensation
- iii. First-line supervisor resistance
- iv. Lack of planning
- v. Lack of management support
- vi. Access to information systems
- vii. Lack of union support

49. Give the steps involved in training process?

- 1st. Make everyone aware of what the training is all about.
- 2nd. Get acceptance.
- 3rd. Adapt the program.
- 4th. Adapt to what has been agreed upon.

50. Define Recognition and Reward?

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.

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.

51. What are the types of appraisal formats?

- i. Ranking
- ii. Narrative
- iii. Graphic
- iv. Forced choice

52. What are the benefits of employee involvement?

Employee Involvement improves quality and increases productivity because

- _Employees make better decisions using their expert knowledge of the process.
- _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.

53. What are the basic ways for a continuous process improvement?

- _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.

54. What are the three components of the Juran Trilogy?

- i. Planning
- ii. Control
- iii. Improvement

55. What are the steps in the PDSA cycle?

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

- 1st. Plan carefully what is to be done
- 2nd. Carry out the plan
- 3rd. Study the results

4th. Act on the results by identifying what worked as planned and what didn't.

56. What are the phases of a Continuous Process Improvement Cycle?

- a) Identify the opportunity
- b) Analyze the process
- c) Develop the optimal solutions
- d) Implement
- e) Study the results
- f) Standardize the solution
- g) Plan for the future

57. Define 5S?

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 should concentrate 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.

58. What is a Kaizen?

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 more efficient, effective, under control and adaptable.

59. What are the three key elements to a partnering relationship?

- i. Long-term commitment
- ii. Trust

iii. Shared vision

60. What are the three types of sourcing?

- a) Sole sourcing
- b) Multiple sourcing
- c) Single sourcing

61. What are the ten conditions for the 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 is easily 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.

62. What are the four phases of inspection?

- i. 100% inspection
- ii. Sampling
- iii. Audit
- iv. Identity check

63. What are the objectives of Performance measures?

- i. Establish baseline measures and reveal trends.
- ii. Determine which processes need to be improved.
- iii. Indicate process gains and losses.
- iv. Compare goals with actual performance.
- v. Provide information for individual and team evaluation.
- vi. Provide information to make informed decisions.

vii. Determine the overall performance of the organization.

64. What are the characteristics used to measure the performance of a particular process?

- i. Quantity
- ii. Cost
- iii. Time
- iv. Accuracy
- v. Function
- vi. Service
- vii. Aesthetics

65. Give the six basic techniques for presenting performance measures?

- a) Time series graph
- b) Control chart
- c) Capability index
- d) Taguchi's Loss Function
- e) Cost of poor quality
- f) Malcolm Baldrige National Quality Award

66. Give the seven tools of quality?

- i. Pareto Diagram
- ii. Process Flow Diagram
- iii. Cause-and-Effect Diagram
- iv. Check Sheets
- v. Histogram
- vi. Control Charts
- vii. Scatter Diagrams

67. Define Statistics?

Statistics is defined as the science that deals with the collection, tabulation, analysis, interpretation, and presentation of quantitative data.

68. What is a measure of central tendency?

A measure of central tendency of a distribution is a numerical value that describes the central position of the data or how the data tend to build up in the center.

There are three measures in common in use in quality viz, the average, the median and the mode.

69. What is Measures of dispersion?

Measures of dispersion describe how the data are spread out or scattered on

each side of the central value. The measures of dispersion used are range and standard deviation.

70. What is a normal curve?

The normal curve is a symmetrical, unimodal, bell-shaped distribution with the mean, median and mode having the same value.

71. What is the use of the control chart?

The control chart is used to keep a continuing record of a particular quality characteristic. It is a picture of process over time.

72. Give the objectives of the attribute charts?

- i. Determine the average quality level.
- ii. Bring to the attention of management any changes in the average.
- iii. Improve the product quality.
- iv. Evaluate the quality performance of operating and management personnel.
- v. Determine acceptance criteria of a product before shipment to the customer.

73. Define Six Sigma Problem Solving Method?

Define - improvement opportunity with an emphasis on increasing customer satisfaction.

Measure - determine process capability (C_p / C_{pk}) & dpmo (defects per million opportunities).

Analyze - identify the vital few process input variables that affect key product output variables ("Finding the knobs").

Improve - Make changes to process settings, redesign processes, etc. to reduce the number of defects of key output variables.

Control - Implement process control plans, install real-time process monitoring tools, standardize processes to maintain levels.

74. What are the new seven management tools?

- i. Affinity Diagram
- ii. Interrelationship Digraph
- iii. Tree Diagram
- iv. Matrix Diagram
- v. Prioritization Matrices
- vi. Process Decision Program Chart
- vii. Activity Network diagram

75. Define Benchmarking?

Benchmarking is a systematic method by which organizations can measure themselves against the best industry practices. The essence of benchmarking is

the process of borrowing ideas and adapting them to gain competitive advantage. It is a tool for continuous improvement.

76. Enumerate the steps to benchmark?

- a) Decide what to benchmark
- b) Understand current performance
- c) Plan
- d) Study others
- e) Learn from the data
- f) Use the findings

77. What are the types of benchmarking?

- i. Internal
- ii. Competitive
- iii. Process

78. What is a QFD?

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

79. What are the benefits of QFD?

- i. Customer driven
- ii. Reduces implementation time
- iii. Promotes teamwork
- iv. Provides documentation

80. What are the steps required to construct an affinity diagram?

- i. Phrase the objective
- ii. Record all responses
- iii. Group the responses
- iv. Organize groups in an affinity diagram

81. What are the parts of house of quality?

- i. Customer requirements
- ii. Prioritized customer requirements
- iii. Technical descriptors
- iv. Prioritized technical descriptors
- v. Relationship between requirements and descriptors
- vi. Interrelationship between technical descriptors

82. How will you build a house of quality?

- a) List customer requirements
- b) List technical descriptors
- c) Develop a relationship matrix between WHATs and HOWs\
- d) Develop an interrelationship matrix between HOWs
- e) Competitive assessments
- f) Develop prioritized customer requirements
- g) Develop prioritized technical descriptors

83. Define FMEA?

Failure Mode Effect Analysis is an analytical technique that combines the technology and experience of people in identifying foreseeable failure modes of a product or process and planning for its elimination.

84. What are the stages of FMEA?

1. Specifying possibilities
 - a. Functions
 - b. Possible failure modes
 - c. Root causes
 - d. Effects
 - e. Detection/Prevention
2. Quantifying risk
 - a. Probability of cause
 - b. Severity of effect
 - c. Effectiveness of control to prevent cause
 - d. Risk priority number
3. Correcting high risk causes
 - a. Prioritizing work
 - b. Detailed action
 - c. Assigning action responsibility
 - d. Check points on completion
4. Revaluation of risk

85. What are the goals of TPM?

The overall goals of Total Productive Maintenance, which is an extension of TQM are

- i. Maintaining and improving equipment capacity
- ii. Maintaining equipment for life
- iii. Using support from all areas of the operation

- iv. Encouraging input from all employees
- v. Using teams for continuous improvement

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

- a) Management learns the new philosophy
- b) Management promotes the new philosophy
- c) Training is funded and developed for everyone in the organization
- d) Areas of needed improvement are identified
- e) Performance goals are formulated
- f) An implementation plan is developed
- g) Autonomous work groups are established

87. What are the major loss areas?

- i. Planned downtime
- ii. Unplanned downtime
- iii. Idling and minor stoppages
- iv. Slow-downs
- v. Process nonconformities
- vi. Scrap

88. Give the ISO 9000 Series of Standards?

- i. ISO 9000, “Quality Management and Quality Assurance Standards Guidelines for Selection and Use”.
- ii. ISO 9001, “Quality Systems – Model for Quality Assurance in Design, Development, Production, Installation & Servicing”.
- iii. ISO 9002, “Quality Systems – “Model for Quality Assurance in Production, Installation & Servicing”.
- iv. ISO 9003, “Quality Systems – “Model for Quality Assurance in Final Inspection and Test”.
- v. ISO 9004-1, “Quality Management and Quality System Elements – Guidelines”.

89. 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.

90. Give some other quality systems?

- i. QS-9000

ii. TE-9000

iii. AS9000

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

- i. Senior management commitment
- ii. Appoint the management representative
- iii. Awareness
- iv. Appoint an implementation team
- v. Training
- vi. Time schedule
- vii. Select element owners
- viii. Review the present system
- ix. Write the documents
- x. Install the new system
- xi. Internal audit
- xii. Management review
- xiii. Preassessment
- xiv. Registration

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

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

93. What are the ISO/QS 9000 elements?

- i. Management responsibility
- ii. The Quality system
- iii. Contract review
- iv. Design control
- v. Document and data control

- vi. Purchasing
- vii. Control of customer-supplied product
- viii. Product identification and traceability
- ix. Process control
- x. Inspection and testing
- xi. Control of inspection, measuring and test equipment
- xii. Inspection and test status
- xiii. Control of nonconforming product
- xiv. Corrective and preventive action
- xv. Handling, storage, packaging, preservation and delivery
- xvi. Control of quality records
- xvii. Internal quality audits
- xviii. Training
- xix. Servicing
- xx. Statistical techniques

94. Give 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 auditee to think about the process, thereby creating possible improvements.

95. What are the requirements of ISO 14001?

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

96. What are the benefits of ISO 14000?

- a. Global
 - i. Facilitate trade and remove trade barriers
 - ii. Improve environmental performance of planet earth

iii. Build consensus that there is a need for environment management and a common terminology for EMS.

b. Organizational

i. Assuring customers of a commitment to environmental management

ii. Meeting customer requirements

iii. Maintaining a good public / community relations image

iv. Satisfying investor criteria and improving access to capital

v. Obtaining insurance at reasonable cost

vi. Increasing market share that results from a competitive advantage

vii. Reducing incidents that result in liability

viii. Improving defense posture in litigation

ix. Conserving input materials and energy

x. Facilitating the attainment of permits and authorization

xi. Improving industry/government relations

97. What are the four elements for the checking

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

a) Monitoring and measuring

b) Nonconformance and corrective and preventative action

c) Records

d) EMS audit

98. 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

99. 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

100. Give the types of Organizational Evaluation Standards?

- i. Environmental Management System
- ii. Environmental Auditing
- iii. Environmental Performance Evaluation

101. Give the types of Product Evaluation Standards?

- i. Environmental Aspects in Product Standards
- ii. Environmental Labeling
- iii. Life-Cycle Assessment

102. Discuss about ISO 9000:2000 Quality Systems?

The term ISO 9000 refers to a set of quality management standards. ISO 9000 currently includes three quality standards: ISO 9000:2000, ISO 9001:2000, and ISO 9004:2000. ISO 9001:2000 presents requirements, while ISO 9000:2000 and ISO 9004:2000 present guidelines.

ISO's purpose is to facilitate international trade by providing a single set of standards that people everywhere would recognize and respect.

The ISO 9000 2000 Standards apply to all kinds of organizations in all kinds of areas. Some of these areas include manufacturing, processing, servicing, printing etc

103. Why is ISO 9000 important?

1 Focus on your customers Organizations rely on customers. Therefore:

- _Organizations must understand customer needs.
- _Organizations must meet customer requirements.
- _Organizations must exceed customer expectations.

2 Provide leadership Organizations rely on leaders. Therefore:

- _Leaders must establish a unity of purpose and set the direction the organization should take.
- Leaders must create an environment that encourages people to achieve the organization's objectives.

3 Involve your people Organizations rely on people. Therefore:

- _Organizations must encourage the involvement of people at all levels.
- Organizations must help people to develop and use their abilities.

4 Use a process approach Organizations are more efficient and effective

when they use a process approach. Therefore:

- _Organizations must use a process approach to manage activities and related resources.

5 Take a systems approach Organizations are more efficient and effective when they use a systems approach. Therefore:

- _Organizations must identify interrelated processes and treat them as a system.
- _Organizations must use a systems approach to manage their interrelated processes.

6 Encourage continual improvement Organizations are more efficient and effective when they continually try to improve. Therefore:

- _Organizations must make a permanent commitment to continually improve their overall performance.

7 Get the facts Organizations perform better when their before you decide decisions are based on facts. Therefore:

- _Organizations must base decisions on the analysis of factual information and data.

8 Work with your suppliers Organizations depend on their suppliers to help them create value. Therefore:

Organizations must maintain a mutually beneficial relationship with their suppliers.

104. 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.

105. Analyze TQM?

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.

106. Give the usage of an effective recognition and reward system?

- _Serves as a continual reminder that the organization regards quality and productivity as important.
- Offers the organization a visible technique to thank high achievers for outstanding performance.

- _Provides employees a specific goal to work toward. It motivates them to improve the process.
- Boosts morale in the work environment by creating a healthy sense of competition among individuals and teams seeking recognition.

107. How will you improve the performance appraisal system?

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

108. What are the typical measurements frequently asked by managers and teams?

- ☐_Human Resource
- ☐_Customers
- ☐_Production
- ☐_Research & Development
- ☐_Suppliers
- ☐_Marketing/Sales
- ☐_Administration

109. What are the criteria to evaluate the performance measures?

- Simple
- Few in number
- Developed by users
- Relevance to customer
- Improvement
- Cost
- Visible
- Timely
- Aligned

-Results

110. Give the usage of C&E diagrams?

- _Analyze actual conditions for the purpose of product or service quality improvement, more efficient use of resources, and reduced costs.
- Eliminate conditions causing nonconformities and customer complaints.
- Standardize existing and proposed operations.
- _Educate and train personnel in decision-making and corrective-action activities.

111. Define Six Sigma?

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.

112. What are the various histogram shapes?

- _Symmetrical
- Skewed right
- Skewed left
- Peaked
- _Flat
- _Bimodal
- Plateau distribution
- _Comb distribution
- _Double peaked distribution

113. Differentiate Population & Sample?

Population represents the mathematical world and Sample represents the real world. A population frequency distribution is represented by a smooth curve whereas a sample frequency distribution is represented by a histogram.

114. Give the sources of variation?

- ï Equipment
- ï Material
- ï Environment
- ï Operator

115. Define Run chart?

A run chart is a very simple technique for analyzing the process in the development stage or, for that matter, when other charting techniques are not applicable.

116. Define Control chart?

Control chart is a means of visualizing the variations that occur in the central tendency and the dispersion of a set of observations. It is a graphical record of the quality of a particular characteristic.

117. What are the various patterns of scatter diagrams?

- _Positive correlation
- _Negative correlation
- No correlation
- Negative correlation may exist
- _Correlation by stratification
- _Curvilinear relationship

118. What is the procedure for constructing the tree diagram?

- _Choose an action –oriented objective statement from the interrelationship diagram, affinity diagram, brainstorming, team mission statement, and so forth.
- Using brainstorming, choose the major headings.
- _Generate the next level by analyzing the major headings.

119. Give atleast five standard formats of matrix diagram?

- _L-shaped
- _T-shaped
- Y-shaped
- _C-shaped
- X-shaped

120. What are the benefits of an activity network diagram?

- _A realistic timetable determined by the users.
- _Team members understand the role in the overall plan.
- Bottlenecks can be discovered and corrective action taken.
- Members focus on the critical tasks.

121. What are the generic steps for the development and execution of action plans in benchmarking?

- Specify tasks.
- Sequence tasks.
- _Determine resource needs.
- _Establish task schedule.
- Assign responsibility for each task.
- Describe expected results.

-Specify methods for monitoring results.

122. What are the phases of QFD process?

- i. Product planning
- ii. Part development
- iii. Process planning
- iv. Production planning

123. What are the several types of FMEA?

- î Design FMEA
- î Process FMEA
- î Equipment FMEA
- î Maintenance FMEA
- î Concept FMEA
- î Service FMEA
- î System FMEA
- î Environment FMEA etc

.

124. What does a Design FMEA document contain?

- _FMEA Number
- _Item
- Design Responsibility
- Prepared By
- Model Number / Year-
- _Key Date
- _Fmea Date
- _Core Team
- _Item / Function
- _Potential Failure Mode
- _Potential Effects of Failure
- _Severity
- _Classification
- _Potential Causes / Mechanisms of Failure
- _Occurrence
- _Current Design Controls
- _Detection
- _Risk Priority Number

- Recommended Actions
- _Responsibility and Target Completion Dates
- _Actions Taken

125. What does a Process FMEA document contains?

- _Process Function / Requirements
- _Potential Failure Mode
- _Potential Effects of Failure
- _Severity
- _Classification
- Potential Causes / Mechanisms of Failure
- Occurrence
- _Current Process Controls
- _Detection

126. Define TPM?

T : Total = All encompassing by maintenance and production individuals working together.

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.

127. What are the benefits of ISO?

- _Fewer on-site audit 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.

128. Give the ISO 9001 requirements?

-_Scope

-_Normative Reference

-_Terms and Definitions

-_Quality Management System

-_Management Responsibility

-Resource Management

-_Product Realization

-_Measurement, Analysis & Improvement

129. What are the methods of actual audit?

i. Examination of documents

ii. Observation of activities

iii. Interviews

16 Mark Questions

1. Explain the Dimensions of Quality?

- Performance

- Features

- Conformance

- Reliability

- Durability

- Service

- Response

- Aesthetics

- Reputation

2. Explain Deming Philosophy?

-Create and publish the aims and purposes of the organization.

-_Learn the new philosophy.

-Understand the purpose of inspection.

-_Stop awarding business based on price alone.

_ -Improve constantly and forever the system.

_ -Institute training.

-Teach and institute leadership.

_ -Drive out fear, Create trust and Create a climate for innovation.

- _ -Optimize the efforts of teams, groups and staff areas.
- Eliminate exhortations for the work force.
- Eliminate numerical quotes for the work force.
- _ -Eliminate management by objective.
- _ -Remove barriers that rob people of pride of workmanship.

3. Explain the Analysis Techniques for Quality Costs?

- i. Trend Analysis
- ii. Pareto Analysis

4. Describe the primary categories of Quality cost?

- i. Preventive cost category
- ii. Appraisal cost category
- iii. Internal failure cost category
- iv. External failure cost category

5. Explain the important role of senior management?

- Listening to internal and external customers and suppliers through visits, focus groups and surveys.
- _Communication.
- To drive fear out of the organization, break down barriers, remove system roadblocks, anticipate and minimize resistance to change and in general, change the culture.

6. Explain the various quality statements?

Vision Statement

Mission Statement

Quality Policy Statement

7. Discuss the basic steps to strategic quality planning?

- i. Customer needs
- ii. Customer positioning
- iii. Predict the future
- iv. Gap analysis
- v. Closing the gap
- vi. Alignment
- vii. Implementation

8. Explain the elements of customer service?

- " Organization
- " Customer care

- " Communication
- " Front-line people
- " Leadership

9.Explain Maslow’s Hierarchy of Needs?

Level 1 : Survival

Level 2 : Security

Level 3 : Social

Level 4 : Esteem

Level 5 : Self-actualization

10. Explain the types of teams?

- i. Process improvement team
- ii. Cross-functional team
- iii. Natural work teams
- iv. Self-directed/self-managed work teams

11. Explain the characteristics of successful teams?

- a. Sponsor
- b. Team charter
- c. Team composition
- d. Training
- e. Ground rules
- f. Clear objectives
- g. Accountability
- h. Well-defined decision procedures
- i. Resources
- j. Trust
- k. Effective problem solving
- l. Open communications
- m. Appropriate leadership
- n. Balanced participation
- o. Cohesiveness

12. Explain the stages of team development?

- i. Forming
- ii. Storming
- iii. Norming
- iv. Performing

v. Adjourning

13. Explain the three components of the Juran Trilogy?

i. Planning

ii. Control

iii. Improvement

14 Explain the steps in the PDSA cycle?

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

1st. Plan carefully what is to be done

2nd. Carry out the plan

3rd. Study the results

4th. Act on the results by identifying what worked as planned and what didn't.

15. Explain the phases of a Continuous Process Improvement Cycle?

a) Identify the opportunity

b) Analyze the process

c) Develop the optimal solutions

d) Implement

e) Study the results

f) Standardize the solution

16. Explain 5S?

Sort – (Seiri)

Set In Order (Seiton)

Shine: (Seiso)

Standardize: (Seiketsu)

Sustain: (Shitsuke)

17. Explain the three types of sourcing?

a) Sole sourcing

b) Multiple sourcing

c) Single sourcing

18. Discuss the seven tools of quality?

i. Pareto Diagram

ii. Process Flow Diagram

iii. Cause-and-Effect Diagram

iv. Check Sheets

v. Histogram

vi. Control Charts

vii. Scatter Diagrams

19. Explain the Six Sigma Problem Solving Method?

Define

Measure

Analyze

Improve

Control

20. What are the new seven management tools?

i. Affinity Diagram

ii. Interrelationship Digraph

iii. Tree Diagram

iv. Matrix Diagram

v. Prioritization Matrices

vi. Process Decision Program Chart

vii. Activity Network diagram

21. Explain the steps to benchmark?

- a) Decide what to benchmark
- b) Understand current performance
- c) Plan
- d) Study others
- e) Learn from the data
- f) Use the findings

22. Explain the types of benchmarking?

- i. Internal
- ii. Competitive
- iii. Process

23. Explain the parts of house of quality?

- i. Customer requirements
- ii. Prioritized customer requirements
- iii. Technical descriptors
- iv. Prioritized technical descriptors
- v. Relationship between requirements and descriptors
- vi. Interrelationship between technical descriptors

24. Explain the stages of FMEA?

- 1. Specifying possibilities
 - a. Functions
 - b. Possible failure modes
 - c. Root causes
 - d. Effects
 - e. Detection/Prevention
- 2. Quantifying risk
 - a. Probability of cause
 - b. Severity of effect

25. Explain the steps necessary to implement the Quality Management System?

- i. Senior management commitment
- ii. Appoint the management representative
- iii. Awareness
- iv. Appoint an implementation team

- v. Training
- vi. Time schedule
- vii. Select element owners
- viii. Review the present system
- ix. Write the documents
- x. Install the new system
- xi. Internal audit
- xii. Management review
- xiii. Preassessment

xiv. Registration

26. Explain the ISO/QS 9000 elements?

i. Management responsibility

ii. The Quality system

iii. Contract review

iv. Design control

v. Document and data control

vi. Purchasing

vii. Control of customer-supplied product

viii. Product identification and traceability

ix. Process control

x. Inspection and testing

xi. Control of inspection, measuring and test equipment

xii. Inspection and test status

University Question Bank

Model 1

Part A (10 x 2 = 20 Marks)

1. Define Quality as per Ed. Deming?
2. What do you understand by quality statement?
3. Explain: Empowerment?
4. Explain: Supplier selection?
5. List out various measurements of dispersion in SPC?
6. Explain the rules to be followed in sample selection?
7. List down the pillars of TPM?
8. Explain: Taguchi Quality Loss Function?
9. Explain about NCR?
10. Explain the need for the quality systems in an organization?

Part B (5x16=80 Marks)

11. (a). (i) List out the barriers of TPM implementation?[8]
(ii). Discuss about the analysis techniques for the quality cost?[8]

(or)

- (b). (i). Explain the principles of TQM?[8] (ii) Explain about the strategic planning?[8]
12. (a). Explain the following: (i). 5S[5] (ii) Kaizen[5] (iii) Supplier rating and relationship diagram[6]

(or)

- (b) Discuss about Maslow's need hierarchy theory and Herzberg's two factor theory for motivation?[16]

13. (a). Explain in detail: (i). Process capability[8] (ii). Six sigma[8]

(or)

- (b) Discuss the need, construction and applications of control charts for variables. [16]
14. (a). Discuss the objectives, process, outcome and benefits of FMEA?[16]

(or)

- (b). Explain about the following : (i). QFD process[8] (ii). Benchmarking process[8]

15. (a). (i). Explain about quality system auditing?[8]
(ii) Discuss the implementation of ISO:9000:2000 quality systems?[8]

(or)

- (b). (i). Explain about the documentation process in ISO 9000:2000 systems? [8]
(ii) Discuss ISO 14000 requirements and its benefits?[8]

University Question Bank

Model 2

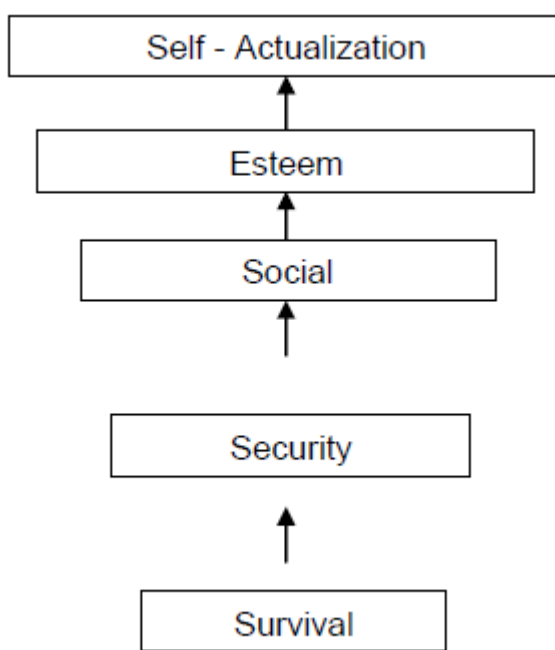
Answer ALL questions

PART A — (10 x 2 = 20 marks)

1. What are the activities of quality planning?
2. What is the philosophy behind „Management by Wandering Around“ (MBWA)?
3. What are the important factors that influence purchase?
4. Is cleanliness the only benefit of implementing „5 S“ practices?
5. What is the purpose of Pareto Diagrams?
6. How are the measures of central tendency used in quality analysis?
7. What are the reasons for benchmarking?
8. What are the losses reduced by TPM?
9. What is the purpose of ISO 9000 quality system?
10. How does the conceptual approach to ISO 14001 differ from ISO 9001?

PART B — (5 X16 = 80 marks)

11. (a) (i) 'What are the dimensions of quality? Discuss eight of them. (8) (ii) What are the duties of quality council? (8) **(Or)**
(b) (i). What are the steps in strategic planning? (8) (ii) What are the barriers to TQM., implementation? How are they eliminated?(8)
12. (a) (i) What is the concern of most consumer? Is it price of the product or service? Explain in detail.(4) (ii) What are the different ways of receiving customer feedback? How are the feedback used? **(or)**
b)(i) What are the types of teams formed in industries? Discuss the functions of any four of them(8) (ii) How is PDCA cycle used? Discuss with a case study. (8)
13. (a) (i) Draw cause and effect diagram for an engineering problem. (8) . (ii) What are the interpretations of different shapes of histograms? (8) . **(or)**
(b) (i) An industrial product was subjected to inspection with a batch size of 500 for ten consecutive days- The number of defective pieces found are 33, 42, 44, 56, 60, 43, 55, 42, 28.and 70. Draw a p-chart and discuss. (12) (ii) How is Process Decision Program Chart (PDPC) used? Give an example. (4)
14. (a) Draw the house of quality for an industrial product. Explain various 4 stages. . (16)



(or)

with an example; Draw the table and give details. (16)
presentation of ISO 9000 quality system. Discuss in detail.

(or)

ement system model with a block diagram.(10) (ii) What
management system? Discuss-in detail.(6)

ALL THE BEST