



## Subject: Production and Operation Management

### Module 04

### CHAPTER 01 QUALITY MANAGEMENT

#### ❖ QUALITY

- According to Quality Guru J.M. Juran quality is nothing but “Fitness for Purpose”
- The assessment for quality of a product or service is subjective
- It may vary from individual to individual
- Customer’s perception of quality may be different from producer’s
- If a third party like **quality certification agency**, has to decide the quality of the product or service, its perception may be different from that of both the customer and the producer
- The criteria are again suited for the designing stage only
- **Quality Control** is defined as maintaining requisite standards in products or services
- **Quality System** is defined as the collection of the resources, organization, equipment, people and procedures which implement the quality policy
- For quality control there are different standards of quality like ISO.
- Six sigma is a quality philosophy for ensuring the reduction of the number of defective products to ideally zero.
- Six sigma can be achieved only when each and every employee in organization has the ability to measure and control quality.



- Quality certification bodies like ISO conduct quality audits of quality system before certifying an organization
- Indian companies are in the favorites' lists of the DEMING AWARDS of JAPAN in the year **2003** there were **five out of eight companies from India**
- **2014 Mahindra & Mahindra Limited, Mahindra Powerol Business [India]**

### ❖ QUALITY MANAGEMENT - A Conceptual Frame Work

- According to **The Oxford Dictionary**- Quality is defined as “the degree of excellence”
- Quality guru **J.M. Juran** defines as- “Fitness for Purpose”
- **Philip Crosby** defined as- “Conformance to Specifications”
- Quality Control is defined as maintaining requisite standards in products or services
- ISO 8402 defines **Quality Control** as- “the optional techniques and activities that are used to fulfill requirements of quality”
- ISO 8402 defines **Quality Assurance** as- “All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy the given requirements for quality”

### ❖ DIMENSIONS OF QUALITY

- **Performance**- how well does the product perform with respect to its intended use?
- **Features**- what special features does the product have?
- **Reliability**- what is the probability of breakdowns, needs for adjustments, replacement of parts etc. in the product
- **Serviceability**- how easily, cheaply, and speedily can the product be repaired and serviced?



- **Durability-** how long can the product perform before needing any repairs or replacement of any part?
- **Appearance-** how pleasant is the outward look, smell, taste, feel, or sound of the product to customers?
- **Safety-** how much care has the company taken to make the product safe for users before, during or after use?
- **Customer service-** how is the behavior and treatment of the seller with the customer before, during, and after the sale of the product?

### ❖ COST OF QUALITY

- Quality is free- is the title of the **famous book by quality guru Philip Crosby**
- Quality guru J.M. Juran is known for the concepts propounded by him regarding the costs of quality
- There are four types of costs related to quality:
  - Costs of prevention of defects
  - Cost of detecting defects in the final product
  - Cost of scrap and rework of defective products
  - Cost of warranty
- It should be emphasized that there is an inverse relation between the costs of prevention defects and the other three types of costs
- If the money spent on prevention of defects is increased usually, the costs of detection of defects, scrap and rework, and warranty claims tend to decrease
- Companies like Motorola. GE, Texas Instruments spend billions of dollars for incurring a high cost for implementing quality philosophy like Six Sigma for prevention of defects in their product



- **Cost of prevention of defects**
  - Training and performing acceptance sampling of raw materials, SQC, SixSigma etc.
- **Cost of detecting defects in the final product**
  - Outgoing inspection of products before being shipped to customers
- **Cost of scrap and rework of defective products**
  - This includes the extra paperwork, delays, rescheduling required etc.
- **Cost of warranty claims**
  - This includes the loss of goodwill on the part of customers

## ❖ QUALITY COST AUDIT

- Quality audit is one of the important tools of TQM for continuous improvement.
- Quality audit may be conducted periodically, or only when occasion demands, due to existence of quality problems.
- According to ISO, “An audit is a systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and suitable to achieve objectives.”

## ❖ OBJECTIVES OF QUALITY AUDITS

- **To Ensure System Compliance:** Compliance means that the written documentation is being followed.
- **To Ensure Procedures are followed:** A Procedure tells who does what, when, and where.



- **To Ensure Compliance to Contracts and Specifications:** To ensure that the requirements of the contract and applicable specifications are being fulfilled is the role of inspection and testing.
- **To Ensure the Evaluation of Products and Services**

## ❖ TYPES OF QUALITY AUDIT

- **System Audit:** A review of how quality standards are measured and met by the company.
- **Process Audit:** Verifies that documented process meets quality.
- **Product Audit:** It verifies that is the physical product meets design specifications and other quality measures.
- **Compliance Audit**

## ❖ STAGES OF QUALITY AUDIT

1. Plan and prepare
2. Arrange and announce
3. Arrive at site of audit, meet, explain purpose
4. Perform audit
5. Informal oral report of finding
6. Formal report with recommendation
7. Follow-up



## ❖ EXPERT VIEW ON QUALITY

### ➤ Deming's contribution to Total Quality Management

- W. Edward Deming has been the most influential quality guru not only for Japanese, but also for the rest of the world
- He was awarded his doctorate in Mathematical physics in 1928
- He then worked for US government service for many years in statistical sampling techniques

Deming's famous **14 points** are as below:

1. Consistency of purpose is a must for continual improvement of a product.
2. Continuous change and innovation is a must for survival.
3. Quality can't be achieved only by inspection; inspection wastes valuable production time and adds to the product's cost without any value addition
4. Wastes should be eliminated in every functional area, not just in production
5. The attitude of supervisor and managers towards workers should be that of a facilitator.
6. The barriers between departments and individuals should be removed
7. Posters and slogans should be eliminated

These must not be used to tell the workers to work harder. Instead, they should be provided with tools and training so that they work smarter leading to better quality



8. Remove obstacles in the good workmanship of hourly workers to instil a sense of pride in them

9. Vigorous programs of retraining and education of employees are a must

10. Numerical targets and work standards may affect quality

11. encourage workers to give quality- improvement ideas without fear

12. Employees should be trained on the job

Training on quality techniques should be continual, as learning never ends

13. The lowest price should not be the sole criteria for selecting a supplier

14. The top management's commitment for ever-improving quality is a must

### ➤ DR. JOSEPH M. JURAN

- According to Dr. Juran, Management should lay stress on continual improvement. By focusing on chronic quality problems and securing breakthrough solutions by adopting new technologies and/or ways of working.
- Training should be provided so that the improvement attained is sustained. The idea is to improve the capability and motivation of workers.

### • Quality Themes of Dr. Juran:

Following are the 5 quality themes of Dr. Juran:

1. **Quality of Design:** The product design should provide the benefits and have the features that customers expect.



2. **Quality Conformance:** The Production system produces components as per the specifications set by designers.
3. **Availability:** Customers can use the product without interruption.
4. **Safety:** Customers are not harmed in any way when they are using the product.
5. **Support:** Customers have easy access to repair and service facilities, which enable them to use the product without interruptions.

### ➤ PHILIP CROSBY

- According to Philip Crosby, Quality is free. A quality management program would lead to such levels of savings that it would pay for itself.
- Crosby's Absolutes of Quality Management
- Following are Crosby's absolutes of quality management:
  - Quality means adherence to specifications.
  - Quality is the responsibility of people who carry out tasks.
  - Perform a task correctly the first time and every time.
  - Quality management is based on prevention.
  - The cost of quality is the cost of rework and rejects.
  - Companies should always produce good-quality with zero defects.

### ❖ FOCUS ON QUALITY

- Most organizations believe that quality is crucial to their long-term survival. following are features of these organizations.
- Quality is their number one priority.
- Focus is on customer.





- Efforts is directed towards continuous improvement.
- Workers are consulted while equipment are purchased.
- Dealers and suppliers are important part of the value chain.
- Quality policy includes three elements:
  - Should fit with organizational goal and strategy.
  - Should make people quality oriented.
  - Should have "Zero defects" as a goal for everyone.

## ❖ QUALITY AT EVERY STAGE

- The ultimate aim of every organization is to deliver quality products to its customers
- For this objective quality is to be monitored at every stage from input to output
- Acceptance sampling is a method of ensuring that the inputs, such as raw materials, parts, components, labour skills etc. are of desired quality levels
- It is also used for the inspection of finished goods before distribution to customers
- Acceptance sampling is applied at the input and output stages of the transformation process
- If a defect arises during the production of a batch of items, all the items will be rejected as scrap
- This will be of immense loss to the company
- Thus, along with the input and output stages the quality is also monitored during the transformation process
- Thus, samples of items are inspected for quality at regular interval of time
- If variations are found, from the previously fixed standards, the reasons for such variations are determined and rectified
- This method of ensuring quality during the transformation process is called **Statistical Process Control** or **Statistical Quality Control**.



## CHAPTER-02 STATISTICAL QUALITY CONTROL

### ❖ Definition of SQC

- It refers to the statistical technique employed for the maintenance of uniform quality in a continuous flow of manufactured product.

### ❖ Causes of Variation

- The magnitude of variability depends upon the production process that is on three M, namely Man, Machine & Material.
- There are two types of causes that leads to variations in quality characteristics namely:

1) Chance Causes

2) Assignable Causes

#### 1) Variations due to Chance Causes

- These variations result from many minor causes and behave in a random manner.
- For example:

A factory producing screws of 1 inch length, some screws are taken and there length are carefully measure. It will find that all screws are not exactly 1 inch length. One or two may be length of 0.99 inch and some of them may be length of 1.01 inch.



- These variations are due to the combine influence of several minor causes of variations which can be negligible and also are inevitable.

## 2) Variations due to Assignable Causes

- Sometimes there is significant variations in the product manufactured by a production process. If the desired length of screw is 1 inch and during inspection is found that it is of 1.27 inch or 0.8 inch, then these variations cannot be regarded as merely due to chance.
- These variations may be due to non-random causes like improper machine, settings, inexperienced operator, inferior raw material, etc.

### ❖ Different assignable causes of variations

- Difference in quality of raw material
- Difference in machine
- Difference in operator
- Difference in time

### ❖ Quality Charts & Control Limits

- A control chart has three horizontal lines starting from the right-hand side of the vertical line and parallel to the base line of the chart. The vertical line is meant for showing the quality statistic of each sample and is known as quality scale.
- The base line is used for making sample number and is termed as subgroup scale.



- The three horizontal lines:
  - 1) Central Limit (CL)
  - 2) Upper Control Limit (UCL)
  - 3) Lower Control Limit (LCL)
- Are known as **Control Lines**.
- If all **sample points** fall in the region stretching between the **two dotted control lines of UCL and LCL** it may be assumed that **the variation in the process of production is wholly due to chance cause** and hence, the process is in the state of statistical control.
- If sample points fall in the region beyond and outside the two dotted control lines the variation in the process is then considered to be out of control.
- The fact is immediately reported to the authorities concerned who in turn search for the causes of variations in the process and rectify the faults.

## ❖ Specification, Process and Revised Limits

### ➤ Specification Limit:

- Control Limits are developed on the basis of understanding between consumer and producer. These control limits are called as Specification Limits.
- For example, if stipulated length of screw is 3 inch and if variation is 0.3 inch the length of screw is acceptable to the consumer then expected level of quality characteristic is 3 inch and consumer will accept the screws of length
- between 2.7 inch and 3.3 inch.

### ➤ Process Limit:

- $C.L. = E(T)$ ,  $L.C.L.=E(T)-3\sigma_t$ ,  $U.C.L. =E(T) +3\sigma_t$



### ➤ Revised Limit:

- When the production process is not under control one or more sample points fall outside the control limits. The point outside the control limits indicate the presence of assignable causes of variations in the production process, when these samples are taken.
- If these samples are removed and control limits are found out on the basis of remaining samples, the new control chart one or more samples points fall outside these new limits. The above process is repeated. In this way control limits are revised until all the sample points fall within the control limits.

### ❖ CONTROL CHARTS FOR VARIABLES

- Quality characteristic of products which are measurable and can be expressed in specific units of measurement is called variable.
- For ex: diameter of bearing can be measured in millimeters, length and width of paper to be printed is measured in centimeter.
- For the purpose of control chart for variable data may be summarized by taking the average and standard deviation or Range (R).

### ➤ $\bar{X}$ Chart

- The  $\bar{X}$  (bar) chart is used to show the quality averages of the samples drawn from a given process.
- On plotting a chart by taking time variable on x- axis and the sample means on y- axis we get chart which is called as  $\bar{X}$  (bar) chart.
- In this chart the central line refers to the mean of sample distribution.



- In addition to this, we also plot two line called upper control limit and lower control limit.

## ➤ R Chart

- The R chart uses sample ranges to monitor changes in the spread of a process.
- The R chart is used to show variability or dispersion of the quality produced by a given process.

## ❖ CONTROL CHARTS FOR ATTRIBUTES

- There are instances in industrial practice where direct measurements are not required or possible.
- Under such circumstances, the inspection results are based on the classification of products as being defective or not defective, acceptable as good or bad accordingly as that product confirms or fails to confirm the specified specification.
- In manufacturing, sometime it is required to control burns, cracks, dents, scratches, missing and wrong components etc. Here, we inspect products only as good or bad but not how much good or how much bad. Furthermore, there are many quality characteristics that come under the category of measurable variables but direct measurement is not taken for reasons of economy.
- Sometimes the quality characteristics of a product are not amenable to measurement.
- Such characteristics can be identified by their absence or presence in the product.
- In such a case control charts for the proportion of defectives p- chart is used.



## ➤ P- Chart

- Control chart for defectives, known as p- chart is used whenever the quality characteristic observed in the classification of items as defective or not defective is the result of inspection castings.
- The objective of this is to evaluate the quality of the items (that is the average fraction defective or % defective) and to note the changes in quality over a period of time.
- The concept of rational sub groups plays an important part in the interpretation of p- chart also. Thus, the inspection results by different inspectors, fraction defective of different machines doing the same job, or of different shifts, have to be charted separately until the evidence shows that the performance of machine, inspectors and different shifts are similar.
- Here, P (process fraction defective) is generally not known and hence it is estimated by the average value of p i.e.  $\bar{p}$  obtained from k samples.

## ➤ np chart

- A np chart shows that the actual number of defective found in each sample.
- If the number of items inspected on each occasion is the same, the plotting of the actual number of defective may be more convenient and meaningful than the fraction defective.
- The construction and interpretation of the number defective chart called np chart is similar to that of p chart.
- The difference is that the actual number of defective (np) in samples of fixed size (n) is plotted instead of the fraction of defective (p) and the central line is at np instead of p.



- There are many situations in industry where the data are obtained by counting. For example, operators not working, machines idle, etc.
- C chart is used for the control of number of defects per unit. Although, the application of C chart is somewhat limited, compared with the P chart, there are many instances in industry where it is useful. For example, In the control of number of defects in material, stains or blemishes on a surface, number of soiled packages in a given consignment, number of weak spots in a given length of wire, number of errors made by a worker during a given period of time, etc.
- The sample size for the C chart is usually any of the fixed time, length, area, a single unit or group of units.

### ❖ DIFFERENCE BETWEEN CHARTS FOR ATTRIBUTES AND CHARTS FOR VARIABLES

CHARTS FOR ATTRIBUTES	CHARTS FOR VARIABLES
P, NP, C charts are used when measurement of production unit is not possible but only by observing characteristic of the sample unit, take a decision about a quality of product.	X bar, R charts are used when the measurement of production unit is possible and the data of sample unit are quantitative in nature.
Control limits of P and NP charts are based on binomial distribution when control limit for C chart is based on Poisson distribution	Control limits of X bar and R charts are based on normal distribution.
It may be used when the sample unit is destructive in nature.	It may be used when the sample unit is not destructive in nature.
The shape and conclusion of P and NP charts are same.	The shape of X bar chart curve and R chart curve is not same.
P or NP chart is used to control proportion of defective per sample.	X bar is used to show the quality average of sample grown process.
C chart is used to control number of defects per unit.	R chart is used to show the variability of quality produced by a given process.





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❖ **TABULAR VALUES**

<b>SAMP LE SIZE= n</b>	<b>A2</b>	<b>D3</b>	<b>D4</b>	<b>D2</b>
<b>2</b>	1.88	0	3.267	1.128
<b>3</b>	1.023	0	2.575	1.593
<b>4</b>	0.729	0	2.282	2.059
<b>5</b>	0.577	0	2.115	2.326
<b>6</b>	0.483	0	2.004	2.534
<b>7</b>	0.419	5.076	1.924	2.704



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## CHAPTER 03

### TOTAL QUALITY MANAGEMENT (TQM)

#### ❖ INTRODUCTION

- A company produces products of inferior quality because of the following reasons:
  - Product design
  - Process design
  - Supply
  - Skill
  - Job design
- Companies have to improve their performance in all these functions to be able to produce products of superior quality.
- Companies have been following the following practices:
  - Quality criteria are set in the company. Designers decide what a product should do and how it should look.
  - Responsibility for quality is assigned to separate department called the quality control department.
  - Quality of a product is evaluated by inspecting it for faults, and statistical methods are used to keep the percentage of defective products to an acceptable level.
  - Quality is customer focused.
  - Focus is on product design and process design.



## ❖ DEFINITIONS

- According to Professor Leopald S. Vasin, “TQM is the control of all transformation processes of an organisation to best satisfy customer’s needs in the most economical manner”.
- Total quality management is a management system for a customer focused organisation that involves all employees in continual improvement of all aspects of the organisation.

## ❖ Elements of TQM

- Organizational Ethics
- Integrity
- Training
- Teamwork
- Communication
- Recognition

## ❖ Importance of TQM

- Better Employee Relations
- Greater Customer Satisfaction
- Increased financial performance
- Increases efficiency and productivity
- Organizational Development



## ❖ Limitations of TQM

- Lack of Top Management Commitment and Vision
- Resistance to Change
- High Costs
- Reduces Morale and Affect Attitude
- Department Based Thinking and Actions

## ❖ SIX-SIGMA

- Motorola pioneered the Six-Sigma program in 1987
- It took five years to yield significant results Motorola attributes US \$ 15billion in savings over the past 11 years to six-sigma
- In 1997, GE CEO Jack Welch, invested US \$380 million in it at GE (General electronics), mostly for training, and it received in the same year US \$700 million from increased productivity
- To understand the six-sigma concept, let us take up an example, of diameter of pencil.
- **For example:** the diameter of a pencil is expressed by manufacturer not only as 7.00 mm, but  $7.00\text{mm} \pm 0.05$ .
- These limits are set by manufacturer at the design stage of the product or specified by the customer for the value of a variable characteristics of the product are called its **specification limit or tolerance limit**.
- The standard deviation of the population is 's'.
- The company wants to take every measure to reduce this variation
- For this purpose, it trains every employee on statistical techniques to measure every critical factor responsible for variation
- Then steps are taken to improve the process and reduce the variation in it



- E.g. workers are trained to reduce mistakes on their part, processes are redesigned for better performance, maintenance of machines is improved etc.
- Thus, standard deviation of the process gets reduced to such that now there is a 12-sigma spread between the USL and LSL
- Note that now there are six standard deviations between the CL and the USL or LSL
- The values  $\mu \pm 6\sigma$  are now at the specification limits
- Now out of every one million pencils produced only 0.002, i.e. practically no pencil will be defective

### ➤ Steps for Implementation of Six Sigma

The following steps are followed while implementing Six Sigma in an organization:

#### **Step-I: Define the priorities of the customers with respect to quality-**

- in this step, attributes of the product that are considered most important by customers in evaluating the quality of the product are identified
- These attributes are called CRITICAL TO QUALITY(CTQ) characteristics the customers' perception of quality attributes are update from time to time by conducting customers survey

#### **Step-II: Measure the processes and the defects arising in the product due to the process-**

- The important processes influencing the CTQ characteristics are identified, and performance measurement techniques are established for these processes
- The processes are measured and thus the defects arising in the product due to processes are identified



### **Step-III: analyze the process to determine the most likely causes of defects**

- The key variables most likely to be responsible for variation in the process are identified to find the reason for defect generation

### **Step-IV: Improve the process performance and remove the causes of the defects**

- Specification limits of the key variables are fixed and a system for measuring the deviations of the variables is established and validated
- The process is improvised in order to keep the variables within specification limits

### **Step-V: Ensure that the improvements are maintained over time-**

- The modified process is subjected to vigil at regular intervals of time to ensure that the key variables do not show any variations

### **❖ CONTRASTING SIX SIGMA AND TQM**

- The most intriguing question faced by most executives implementing Six Sigma in their organization is How is it different from TQM?
- The TQM movement dominated the Quality scenario from the 1970 to mid 1990s
- The late 1990s saw the emergence of Six Sigma as GE brought it to the forefront,
- Initially it seemed as if American companies were trying to produce an answer to the Japanese TQM concept in form of Six Sigma
- The reality is that Six Sigma has become a much broader umbrella compared to TQM, which was mainly confined to the manufacturing sector
- Within the manufacturing sector also, TQM remained mainly focused upon the production department and its associated department as design, engineering etc.



- Six Sigma on the other hand is successful not only in the manufacturing sector, but also in the service sector such as banks, financial institute, insurance companies, healthcare, education etc.
- Let us have a look at the contrasting scenario between the two:
- This acceptance or rejection of a lot or consignment is dependent upon the no. of defective items found in the samples
- **This process of using sampling in incoming or outgoing inspection is called acceptance sampling**

### ❖ TYPES OF SAMPLING PLANS

Different types of sampling plans can be used for acceptance sampling depending upon the number of samples drawn from the lot.

#### ➤ **Single Sampling Plan:**

- In this plan a single sample is drawn from the lot of items.
- E.g. from 10,000 items a sample of 100 units may be drawn at random from the lot
- It is decided by the QC manager that lot will be accepted if 100 samples has say 5 defective pieces else the lot will be rejected
- This limiting number of defective items used to take a decision about accepting or rejecting a lot is called the acceptance number
- In our example  $a=5$  the number of defective items in a sample may be represented by  $d$  if  $d \leq a$ , the lot will be accepted if  $d \geq a$ , the lot will be rejected



## ➤ Double Sampling Plan

- As the name of the plan suggests, we take two samples in this plan for inspection
- For the first sample of 100 units drawn from a lot of say 10,000 units
- The QC manager decides beforehand that if the number of defective items in the sample  $d \leq 5$ , the lot will be accepted, if  $d \geq 12$ , the lot will be rejected
- And if the defects are between  $6 \leq d \leq 11$  a second sample will be drawn
- Now the second sample is inspected and the number of defective items in it is determined
- In the combined sample of 200 units if  $d \leq 17$ , the lot will be accepted otherwise it will be rejected

## ➤ Multiple Sampling Plan

- As discussed in the double sampling plan when more than two samples are chosen, we have a multiple sampling plan
- We note that we move from single sampling plan towards the multiple sampling plan, the complexity of implementation of the plan increases
- The single sampling plan is the simplest in implementation

## ❖ QUALITY SYSTEM STANDARDS

- Quality system standards are used as minimum requirements of quality system in organization.
- They are of two types:





## ➤ Generic Standards:

- These standards are set by national and international quality certification bodies as a guidance, development, or evaluation of quality system in an organization
- Generic means that the same standards can be applied to any organization large/small, product/services, public enterprise or private
- In India we have Bureau of Indian Standards (BIS) as a national organization for setting quality standards and the most popular international standards is ISO 9000.
- ISO 14000 is a generic standard relating to establishing an environment management system in an organization

## ➤ Industry Related Standards

- These standards are set by purchasing bodies for a particular industry as the basic requirements for purchasing products/services
- For example, defense, aerospace, nuclear industries etc. Usually have a set of guidelines for purchasing due to overriding safety requirements
- A new standard came in to existence in 1995-96 called COPC-2000 for customerservice providers.
- **The capability maturity model CMM** is another standard that has been developed by Software Engineering Institute at USA and is **applicable software organizations**
- Eighty Indian companies have attained CMM level 5 out of 117 global companies

## ❖ MANDATORY CERTIFICATION

- **The ISI mark scheme** is essentially a voluntary scheme that is, organizations can decide whether to go for this type of a license from BIS or not
- However, for products falling in the categories of mass consumption, consumer safety, health, and energy conservation, etc. the government has made it mandatory for the organizations to obtain the ISI mark
- **Hallmark for gold jewelry** - this is a purity certification scheme of the BIS
- Hallmarking means that the jewelry articles have been independently tested and the jewelry confirms to the marked fineness
- The BIS logo is marked on the jewelry tested along with the fineness
- The jewelry is assessed only at the BIS recognized assaying and hallmarking systems
- **Purity Grade:** This is the number which shows the purity of Gold. Following is the meaning of these numbers:
  - 958 – 23 carats
  - 916 – 22 carats
  - 875 – 21 carats
  - 750 – 18 carats
  - 708 – 17 carats
  - 585 – 14 carats
  - 375 – 9 carats





➤ **W.e.f. Jan 1,2017**

- The hallmarked gold jewelry will now be available in three grades of 14 carat, 18 carat and 22 carats.
- The cartage will also be marked on jewelry in addition to fineness for convenience of consumers, i.e. for 22 carat jewelry 22K will be marked in addition to 916 (22K916), for 18 carat jewelry 18K will be marked in addition to 750 (18K750), and for 14 carat jewelry, 14K will be marked in addition to 585 (14K585), it added.
- Hallmark on gold jewelry will now have four marks, like the BIS Mark, the purity in carat and fineness (22K916 for 22 carat), assaying center's identification mark and jeweler's identification mark.

➤ **Certification scheme for imported goods-**

- There are two certification schemes in this category
- One for foreign manufacturers and the other for Indian Importers
- These schemes are essentially similar to the product certification scheme of BIS for the domestic industry, apart from slight differences necessary for the operation of these schemes
- Only foreign manufacturers can seek the BIS license for products falling under the mandatory certification scheme while for the rest of the products, both foreign manufacturers as well as the Indian importer can apply for the license



### ➤ **The Eco Mark Scheme**

- This scheme is operated by BIS for the labeling of household and other consumer goods which confirms to certain environmental criteria along with quality requirements in the relevant Indian standards

### ➤ **Environmental management system certification-**

- This certificate is done by BIS for organization complying with the ISO 14000 standard
- Hazard analysis critical control point (HACCP)- for food processing units BIS operates this certification with respect to ISO 9000 and ISO 15000 standards under a single audit scheme
- It is a process control system designed to identify and prevent microbial and other hazardous in food production

### ➤ **Agmark Grading and Standardization of Agriculture and allied commodities**

- Quality standards for Agriculture commodities in India are framed on the basis of their intrinsic quality
- The objective of these standards is the promotion of grading and standardization of agriculture and allied products
- Certification of Agriculture commodities is carried out for the benefit of the producer and consumer



## ❖ INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

- ISO is a non-governmental organization with a central secretariat in GENEVA, Switzerland
- It represents a network of national standards organization of 150 countries
- Our very own BIS is a member of ISO
- ISO is the world's largest developer of standards of various types
- It has till date given 15000 international standards
- Initially in 1946, delegates of 25 countries met in London to create a new international organization with an objective of facilitating the international coordination and unification of industrial standards
- Thus, ISO was born on 23 February 1947
- ISO itself does not perform certification to its ISO 9000 and ISO 14001 management system standards and does not issue ISO 9000 and ISO 14001 certificates
- There are around 750 certification bodies active around the world that issues these certificates to the organizations, after conducting proper audit of their quality/environmental management systems

## ❖ ISO 9000

- This is a series of international quality standards which serves as a guidance to suppliers and purchasers about the minimum requirements of a quality system
- The first edition of ISO 9000 standards was completed in 1986 by its technical committee Ralli Wolf was the first company in India to get ISO 9001 certified in theyear 1988 by BSI, UK
- Three types of certifications are there in ISO 9000 depending upon the activities of the organization seeking the certification:



- **ISO 9001-** this is the most comprehensive of the certificates for an organization engaging in development/design production, installation, and servicing
- **ISO 9002-** this certification is provided to organizations involved only in production and installation of product and services
- **ISO 9003-** to organizations involved only in final inspection and testing. Two documents are provided by ISO as guidance to organizations for understanding various aspects of a good quality system
- **ISO 9001-** this document explains principles and application, and guide to selection and use
- **ISO 9004-** this document explains principle concepts and applications, guide to quality management, and quality system elements
- **ISO 9001:2000-** this is the revised version of the standard that came into existence in the year 2000

#### ❖ **ISO 14000**

- It is a generic standard primarily concerned with environmental management
- This refers to the steps an organization takes to minimize harmful effects on the environment caused by its activities
- BIS has formulated a standard called IS 13967:1993 on the Environmental Management System before ISO 14001



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## ❖ COPC 2000

- A certification mark of Customer Operations Performance Centre Inc., USA
- This standard was created in 1995-96 World's majors like, Microsoft, Compaq, Intel, Novell, Dell, American Express, were among the development team of this standard for improving the level of services provided by the customer service provider (CSPs)
- It is based upon US's Malcolm Baldrige National Quality Award



## CHAPTER 04

# INDUSTRIAL SAFETY & SAFETY MANAGEMENT

### ❖ Meaning of Industrial Safety

- Mainly concerned with minimizing hazards in the industries
- The importance of industrial safety was realized because every year millions of industrial accidents occur which result in either death or in temporary disablement or permanent disablement of the employees
- Serious attention is provided to reduce the rate and severity of accident
- Hazard control and accident prevention have been considered as a basic need
- Health and safety are the basic desire

### ❖ Need for Safety

- **Cost Saving-** when any accident takes place, the management has to pay compensation to the injured employee
- These are the direct costs, but more serious are the indirect costs which cannot be avoided by the employers
- Hidden costs are slowed up production rate, materials spoiled, labor for cleaning, damages to equipment etc.
- **Increased Productivity-** safety plants are efficient plan
- Safety promotes productivity





- Employees in safe plans devotes more time to improve quality and quantity of their output
- **Morale-** safety is important for the humans working in the organization
- Managers must take accident prevention measures to minimize pain and suffering of injured and their family
- **Legal-** there are legal reasons too for undertaking safety measures
- There are laws covering occupational health and safety, and penalties for non-compliance have become quite severe

#### ❖ OBJECTIVES & IMPORTANCE OF INDUSTRIAL SAFETY

- Industrial safety is needed to check all the possible chances of accidents for preventing loss of life and permanent disability
- It is needed to eliminate accidents causing work stoppage and production loss
- It is needed to prevent accidents in industry by reducing hazard to minimum
- Reduce workman's compensation, insurance rate and all the cost of accidents
- It is required to educate all the members regarding the safety principles to avoid accidents in industry
- It is needed to achieve better morale of the industrial employees
- It is required to achieve better human relations within industry
- It is needed to increase production means to a higher standard of living



## ❖ SAFETY MEASURES IN FACTORY

- Material handling when performed manually the chances of injuries are greater
- Hoisting devices must be equipped with limit switches for preventing loads block from over travelling accidentally
- During a crane is operated the operator should be entirely guided by the standard signal and both operator and signaller should be trained
- Proper protection against fire and explosion hazards are required when fuel operated cranes are used
- Where manual loading is done on conveyers which run along vertical path, either partially or totally, safe load sign should be displayed
- Sufficient lighting, ventilation, drainage, escape ways and guarding should be provided
- Riding on a conveyer should always be prohibited all persons working around conveyer must wear tight clothes and shoes
- All rotating, parts of machinery should be protected
- Effective lubrication schedule should be worked out and implemented
- All inspection should be carried out and if any worn out parts, it should be replaced immediately
- Industrial personnel and unskilled workers should be trained to adopt safe working habits in the proper ways of lifting and setting down the objects
- Objects which are wet or dirty have slippery surfaces, should be completely wiped off dry before handling them
- For prevention of hand injuries, the handlers should be made to wear protective clothing like leather hand gloves
- Unskilled industrial workers should be properly trained for keeping correct position of their feet, back and knees



- Supervision provided for load carrying team or group
- While transportation by truck, the truck should be operated at safe limits
- During storing material, it should be ensured that electric panels are fire proof and also the pathways, entries and exits are kept clear for movement
- The use of racks and bins enables more storage capacity, easy movement of material and safety'

## ❖ SAFETY MANAGEMENT

- According to the National Safety Management Society, safety management is an integral part of an organization's responsibility, as it displays the company's commitment to the welfare of its employees
- It is a function that enhances company performance by predicting operational, procedural, or environmental risks and threats before they occur

## ❖ OBJECTIVES

- Injury prevention
- Emergency readiness
- Training objectives
- Other objectives
  - Gain support from people for health and safety effort
  - Motivate, educate, and train employee to know hazards
  - Achieve hazard control
  - Support inspection system
  - Comply with regulations and standards



## ❖ BUILDING BLOCKS OF SAFETY MANAGEMENT

- **Senior management's commitment-** just like any other management activity, it requires allocation of resources, this is a function of senior management. Hence senior management's commitment is required
- **Effective safety reporting-** to manage safety, it is required to maintain safety data on hazards most of these data is acquired through voluntary and self-reporting
- **Continuous monitoring-** through various systems that collect safety data during operations. Data collection is just a step, after that it should be analyzed and information must be generated from it
- **Investigation of Safety Occurrences-** investigation of safety occurrences to identify the safety deficiencies
- **Sharing safety lessons and best practices-** through active exchange of safety information.
- **Integration of safety training for operational personnel-** do training for operational personnel including safety.
- **Effective implementation of Standard Operating Procedures-** standard procedures should be implemented and maintained through checklists and briefings.
- **Continuous improvement-** managing safety is not a once done activity. It is an ongoing activity that can be successful only through continuous improvement



Sr.No.	Question	Answer
1.	According to Quality Guru J.M. Juran what is Quality?	Quality is nothing but “Fitness for Purpose”
2.	The assessment for quality of a product or service is subjective. True/False?	True
3.	Do Quality may vary from individual to individual?	Yes
4.	Customer’s perception of quality is Same or Different from producer?	Different
5.	Who has to decide the quality of the product or service, its perception may be different from that of both the customer and the producer?	Quality certification agency
6.	What is Quality Control?	QC id defined as maintaining requisite standards in products or services
7.	What is Quality System?	Quality System is defined as the collection of the resources, organization, equipment, people and procedures which implement the quality policy
8.	Six sigma is a quality philosophy for ensuring the reduction of the number of defective products to ideally zero. True/False?	True
9.	Six sigma can be achieved only when?	When each and every employee in organization has the ability to measure



		and control quality.
10.	Quality certification bodies like ISO conduct quality audits of quality system before certifying an organization. True/False?	True
11.	According to The Oxford Dictionary what is Quality?	Quality is defined as “the degree of excellence”.
12.	What is Quality as guru J.M. Juran?	“Fitness for Purpose”
13.	What is Quality as Philip Crosby?	“Conformance to Specifications”
14.	As ISO 8402 what is Quality Control	The optional techniques and activities that are used to fulfill requirements of quality
15.	As ISO 8402 what is Quality Assurance?	“All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy the given requirements for quality”
16.	Who has written Quality is free?	Quality guru Philip Crosby
17.	Why do quality guru J.M. Juran is well known?	For the concepts propounded by him regarding the costs of quality
18.	What are the costs related to quality?	1. Costs of prevention of defects; 2. Cost of detecting defects in the final product; 3. Cost of scrap and rework of



		defective products; 4. Cost of warranty;
19.	It should be emphasized that there is an inverse relation between the costs of prevention defects and the other three types of costs. True /False?	True
20.	If the money spent on prevention of defects is increased usually, the costs of detection of defects, scrap and rework, and warranty claims tend to decrease. True /False?	True
21.	Which Companies spend billions of dollars for incurring a high cost for implementing quality philosophy like Six Sigma for prevention of defects in their product?	Companies like Motorola. GE, Texas Instruments
22.	When Quality audit may be conducted?	Quality audit may be conducted periodically, or only when occasion demands, dueto existence of quality problems.
23.	What is Audit According to ISO?	“An audit is a systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and suitable to achieve



		objectives.”
24.	What is the meaning of Compliance?	Compliance means that the written documentation is being followed.
25.	What do A Procedure do?	A Procedure tells who does what, when, and where.
26.	What is System Audit?	A review of how quality standards are measured and met by the company.
27.	What do Process Audit do?	Verifies that documented process meets quality
28.	What do Product Audit do?	It verifies that is the physical product meets design specifications and other quality measures.
29.	What are the STAGES OF QUALITY AUDIT?	<ol style="list-style-type: none"> <li>1. Plan and prepare;</li> <li>2. Arrange and announce</li> <li>3. Arrive at site of audit, meet, explain purpose</li> <li>4. Perform audit</li> <li>5. Informal oral report of finding</li> <li>6. Formal report with recommendation</li> <li>7. Follow-up</li> </ol>
30.	W. Edward Deming has been the most influential quality guru not only for Japanese, but also for the rest of the world. True /False?	True
31.	Consistency of purpose is a must for continual improvement of a product.	True





	True /False?	
32.	Continuous change and innovation is a must for survival. True /False?	True
33.	Quality can't be achieved only by inspection; inspection wastes valuable production time and adds to the product's cost without any value addition.  True /False?	True
34.	Wastes should be eliminated in every functional area, not just in production.  True /False?	True
35.	According to Dr. Juran, Management should lay stress on continual improvement.By focusing on chronic quality problems and securing breakthrough solutions by adopting new technologies and/or ways of working. True/False?	True
36.	Dr. Juran gave how many quality themes?	5 quality themes
37.	As Dr.Juran what is Quality of Design in Quality themes?	The product design should provide the benefits and have thefeatures that customers expect.
38.	As Dr.Juran what is Quality Conformance in Quality themes?	The Production system produces components as per thespecifications set by designers.



39.	According to Philip Crosby, Quality is free. A quality management program would lead to such levels of savings that it would pay for itself. True/False?	True
40.	Quality means adherence to specifications. Quality is the responsibility of people who carry out tasks. Perform a task correctly the first time and every time. Who told these?	Philip Crosby
41.	Most organizations believe that quality is crucial to their long-term survival. following are features of these organizations. True/False?	True
42.	Efforts is directed towards continuous improvement and Workers are consulted while equipment are purchased. True/False?	True
43.	Quality policy includes which elements?	<ol style="list-style-type: none"> <li>1. Should fit with organizational goal and strategy.</li> <li>2. Should make people quality oriented.</li> <li>3. Should have "Zero defects" as a goal for everyone.</li> </ol>
44.	What is the ultimate aim of every organization?	To deliver quality products to its customers
45.	Quality is to be monitored at every stage from input to output. True /False?	True



46.	What is Acceptance sampling?	Acceptance sampling is a method of ensuring that the inputs, such as raw materials, parts, components, labour skills etc. are of desired quality levels
47.	How do Acceptance sampling used?	Used for the inspection of finished goods before distribution to customers
48.	Acceptance sampling is applied at the input and output stages of the transformation process. True/False?	True
49.	If a defect arises during the production of a batch of items, all the items will be rejected as scrap. True/False?	True
50.	If a defect arises during the production of a batch of items, all the items will be rejected as scrap. Is it loss to the company?	This will be of immense loss to the company
51.	If variations are found, from the previously fixed standards, the reasons for such variations are determined and rectified. True/False?	True
52.	Samples of items are inspected for quality at regular interval of time. True/False?	True
53.	What is Statistical Process Control or Statistical Quality Control?	It refers to the statistical technique employed for the maintenance of uniform quality



		in a continuous flow of manufactured product
54.	The magnitude of variability depends upon what?	The production process
55.	What are three M?	Man, Machine & Material.
56.	What are the causes that leads to variations in quality characteristics?	<ol style="list-style-type: none"> <li>1. Chance Causes</li> <li>2. Assignable Causes</li> </ol>
57.		
58.	What is the reason behind variations?	Variations are due to the combine influence of several minor causes of variations which can be negligible and also are inevitable.
59.	What are Different assignable causes of variations?	<ol style="list-style-type: none"> <li>1.Difference in quality of raw material;</li> <li>2.Difference in machine</li> <li>3.Difference in operator</li> <li>4.Difference in time</li> </ol>
60.	A control chart has how many horizontal lines?	3
61.	What is subgroup scale?	The base line is used for making sample number and is termed as subgroup scale.
62.	What are The three horizontal lines?	<ol style="list-style-type: none"> <li>1.Central Limit (CL)</li> <li>2.Upper Control Limit (UCL)</li> <li>3.Lower Control Limit (LCL)</li> </ol>
63.	Sample points fall in the region stretching between the two dotted control lines of UCL and LCL it may be assumed that the variation in the process of production is	True



	wholly due to chance cause and hence, the process is in the state of statistical control. True/False?	
64.	If sample points fall in the region beyond and outside the two dotted control lines the variation in the process what will happen?	Then considered to be out of control
65.	Control Limits are developed on the basis of what?	Understanding between consumer and producer.
66.	What do you know by Specification Limits?	Control Limits are developed on the basis of understanding between consumer and producer. These control limits are called as Specification Limits.
67.	If stipulated length of screw is 3 inch and if variation is 0.3 inch the length of screw is acceptable to the consumer then expected level of quality characteristic is 3 inch and consumer will accept the screws of length between 2.7 inch and 3.3 inch. True/False?	True
68.	What if the production process is not under control?	One or more sample points fall outside the control limits.
69.	What do The point outside the control limits indicate?	The presence of assignable causes of variations in the production process, when these samples are taken.
70.	What do The point outside the control limits indicates?	The presence of assignable causes of variations in the production process, when



		these samples are taken.
71.	What do you know by variable?	Quality characteristic of products which are measurable and can be expressed in specific units of measurement is called variable.
72.	For the purpose of control chart for variable data may be summarized by taking the average and standard deviation or Range (R). True /False?	True
73.	Why The X (bar) chart is used?	To show the quality averages of the samples drawn from a given process.
74.	What is sample distribution in chart?	In the chart the central line refers to the mean of sample distribution
75.	Why The R chart used?	The R chart uses sample ranges to monitor changes in the spread of a process and to show variability or dispersion of the quality produced.
76.	There are instances in industrial practice where direct measurements are not required or possible. True /False?	True
77.	The inspection results are based on what?	Classification of products as being defective or not defective, acceptable as good or bad accordingly as that product confirms or



		fails to confirm the specified specification.
78.	There are many quality characteristics that come under the category of measurable variables but direct measurement is not taken for reasons of economy. True/False?	True
79.	Do Sometimes the quality characteristics of a product are not amenable to measurement?	Yes
80.	When do control charts for the proportion of defectives p- chart is used?	Sometimes the quality characteristics of a product are not amenable to measurement. Such characteristics can be identified by their absence or presence in the product and control charts for the proportion of defectives p- chart is used.
81.	When p- chart can be used?	P- Chart is used whenever the quality characteristic observed in the classification of items as defective or not defective is the result of inspection castings.
82.	The concept of rational sub groups plays an important part in the interpretation of p- chart also. True/False?	True



83.	What do A np chart shows?	that the actual number of defective found in each sample.
84.	If the number of items inspected on each occasion is the same, the plotting of the actual number of defective may be more convenient and meaningful than the fraction defective. True /False?	True
85.	What is NP Chart?	The construction and interpretation of the number defective chart called NP chart is similar to that of P chart.
86.	The difference is that the actual number of defective (np) in samples of fixed size (n) is plotted instead of the fraction of defective (p) and the central line is at np instead of p. True /False?	True
87.	There are many situations in industry where the data are obtained by counting, give example of this scenario.	Operators not working, machines idle, etc.
88.	Why do C chart is used for?	C chart is used for the control of number of defects per unit
89.	the application of C chart is somewhat limited, compared with the P chart. True/False?	True
90.	What is the The sample size for the C chart ?	Usually any of the fixed time, length, area, asingle





		unit or group of units.
91.	When P, NP, C charts are used?	P, NP, C charts are used when measurement of production unit is not possible but only by observing characteristic of the sample unit, take a decision about a quality of product.
92.	When X bar, R charts are used?	X bar, R charts are used when the measurement of production unit is possible and the data of sample unit are quantitative in nature.
	Control limits of P and NP charts are based On what?	Binomial distribution when control limit for C chart is based on Poisson distribution
93.	Control limits of X bar and R charts are based on what?	Normal distribution.
94.	P or NP chart is used to control proportion of defective per sample. True/False?	True
95.	A company produces products of inferior quality because of which reasons?	<ul style="list-style-type: none"> <li>● Product design</li> <li>● Process design</li> <li>● Supply</li> <li>● Skill</li> <li>● Job design</li> </ul>
96.	Quality criteria are set in the company. Designers decide what a product should do and how it should look. True/False?	True



97.	What is qualitycontrol department?	Responsibility for quality is assigned to separate department called the qualitycontrol department.
98.	Quality of a product is evaluated by inspecting it for faults, and statistical methodsare used to keep the percentage of defective products to an acceptable level. True/False?	True
99.	Do Quality is customer focused?	Yes
100.	What is Total quality management?	Total quality management is a management system for a customer focused organisation that involves all employees in continual improvement of all aspects ofthe organisation.
101.	As Professor Leopald S. Vasin what is TQM?	“TQM is the control of all transformation processes of an organisation to best satisfy customer’s needs in the most economical manner”.
102.	What are the Elements of TQM?	<ul style="list-style-type: none"> <li>● Organizational Ethics</li> <li>● Integrity</li> <li>● Training</li> <li>● Teamwork</li> <li>● Communication</li> <li>● Recognition</li> </ul>



103.	Why TQM is Important?	<ul style="list-style-type: none"> <li>• Better Employee Relations</li> <li>• Greater Customer Satisfaction</li> <li>• Increased financial performance</li> <li>• Increases efficiency and productivity</li> <li>• Organizational Development</li> </ul>
104.	Is there Lack of Top Management Commitment and Vision in TQM?	Yes
105.	Which company pioneered the Six-Sigma program?	Motorola in 1987
106.	It took five years to yield significant results Motorola attributes US \$ 15billion in savings over the past 11 years to six-sigma. True/False?	True
107.	What is specification limit or tolerance limit?	These limits are set by manufacturer at the design stage of the product or specified by the customer for the value of a variable characteristics of the product are called its specification limit or tolerance limit.
108.	The company wants to take every measure to reduce this variation. True/False?	True
109.	Standard deviation of the process gets reduced to such that now there is a 12-sigma	True



	spread between the USL and LSL. True/False?	
110.	What is the 1 <sup>st</sup> Step for Implementation of Six Sigma?	Define the priorities of the customers with respect to quality.
111.	What	Attributes of the product that are considered most important by customers in evaluating the quality of the product are identified
112.	What is CRITICAL TO QUALITY(CTQ)?	characteristics the customers' perception of quality attributes are update from time to time by conducting customers survey
113.	What is the 2 <sup>nd</sup> Step for Implementation of Six Sigma?	Measure the processes and the defects arising in the product due to the process
114.	What is the full form of CTQ?	CRITICAL TO QUALITY(CTQ)
115.	The important processes influencing the CTQ characteristics are identified, and performance measurement techniques are established for the processes. True/False?	True
116.	The processes are measured and thus the defects arising in the product due to processes are identified. True/False?	True
117.	What is acceptance sampling?	The acceptance or rejection of a lot or consignment is dependent upon the no. of



		defective items found in the samples This process of using sampling in incoming or outgoing inspection is called acceptance sampling
118.	Six Sigma on the other hand is successful not only in the manufacturing sector, but also in the service sector such as banks, financial institute, insurance companies, healthcare, education etc. True/False?	True
119.	Different types of sampling plans can be used for acceptance sampling depending upon the number of samples drawn from the lot. True/False?	True
120.	What is Single Sampling Plan?	In this plan a single sample is drawn from the lot of items.
121.	What is Acceptance number?	The limiting number of defective items used to take a decision about accepting or rejecting a lot is called the acceptance number
122.	What is Double Sampling Plan?	As the name of the plan suggests, Company take two samples in this plan for inspection
123.	What is Multiple Sampling Plan?	In the double sampling plan when more than two samples are chosen, we have a multiple sampling plan
124.	In which plan the complexity of implementation of the plan increases?	Multiple Sampling Plan



125.	The single sampling plan is the simplest in implementation. True/False?	True
126.	Quality system standards are used as minimum requirements of quality system in organization. True /False?	True
127.	Generic standards are set by whom?	By national and international quality certification bodies as a guidance, development, or evaluation of quality system in an organization
128.	What do you know by Generic?	Generic means that the same standards can be applied to any organization large/small, product/services, public enterprise or private
129.	What is BIS?	Bureau of Indian Standards (BIS)
130.	Who sets quality standards in India?	Bureau of Indian Standards
131.	Who sets quality standards in international level?	ISO
132.	What is ISO 14000?	ISO 14000 is a generic standard relating to establishing an environment management system in an organization
133.	Industry Related Standards are set by whom?	These standards are set by purchasing bodies for a particular industry as the



		basic requirements for purchasing products/services
134.	What is COPC-2000?	A new standard came in to existence in 1995-96 called COPC-2000 for customer service providers.
135.	What is CMM?	Capability Maturity Model
136.	Eighty Indian companies have attained CMM level 5 out of 117 global companies True/False?	True
137.	The ISI mark scheme is essentially a voluntary scheme that is, organizations can decide whether to go for this type of a license from BIS or not. True/False?	True
138.	What is Hallmark for gold jewellery?	Hallmarking means that the jewelry articles have been independently tested and the jewelry confirms to the marked fineness
139.	The BIS logo is marked on the jewelry tested along with the fineness. True/False?	True
140.	what are the two certification schemes?	One for foreign manufacturers and the other for Indian Importers
141.	Only foreign manufacturers can seek the BIS license for products falling under the mandatory certification scheme while for the rest of the products, both foreign manufacturers as well as the Indian	True



	importer can apply for the license. True/False?	
142.	Quality standards for Agriculture commodities in India are framed on the basis of what?	Their intrinsic quality
143.	Certification of Agriculture commodities is carried out for the benefit of the producer and consumer. True/False?	True
144.	ISO is a non-governmental organization with a central secretariat in GENEVA, Switzerland. True/False?	True
145.	What do ISO represents?	ISO represents a network of national standards organization of 150 countries
146.	Do BIS is a member of ISO?	Yes
147.	What is the world's largest developer of standards of various types?	ISO
148.	In 1946, delegates of 25 countries met in London to create a new international organization with an objective of facilitating the international coordination and unification of industrial standards. True/False?	True
149.	When ISO was born?	ISO was born on 23 February 1947w
150.	ISO itself does not perform certification to its ISO 9000 and ISO 14001 managementsystem standards and does not issue ISO 9000 and ISO 14001	True





	certificates. True /False?	
151.	What is ISO 9000?	This is a series of international quality standards which serves as a guidance to suppliers and purchasers about the minimum requirements of a quality system
152.	What was the first company in India to get ISO 9001 certified in the year 1988 by BSI, UK?	Ralli Wolf
153.	How many types of certifications are there in ISO 9000?	Three
154.	The first edition of ISO 9000 standards was completed in which year?	1986
155.	What is ISO 9001?	This is the most comprehensive of the certificates for an organization engaging in development/design production, installation, and servicing
156.	What is ISO 9002?	This certification is provided to organizations involved only in production and installation of product and services
157.	What is ISO 9003?	To organizations involved only in final inspection and testing. Two documents are provided by ISO as guidance to organizations



		for understanding various aspects of a good quality system
158.	What is ISO 9001?	This document explains principles and application, and guide to selection and use
159.	What is ISO 9004?	This document explains principle concepts and applications, guide to quality management, and quality system elements
160.	What is the revised version of the standard that came into existence in the year 2000	ISO 9001:2000
161.	It is a generic standard primarily concerned with environmental management, This refers to the steps an organization takes to minimize harmful effects on the environment caused by its activities	
162.	BIS has formulated a standard called IS 13967:1993 on the Environmental Management System before ISO 14001. True/False?	True
163.	What do Industrial Safety Mainly concerned with?	Minimizing hazards in the industries
164.	Do Hazard control and accident prevention can be consider as a basic need?	Yes
165.	When any accident takes place who has to pay compensation to the injured employee ?	The management
166.	Hidden costs are slowed up production	True



	rate, materials spoiled, labor for cleaning,damages to equipment etc. True/False?	
167.	Employees in safe plans devotes more time to improve what?	Quality and Quantity of their output
168.	Managers must take accident prevention measures to minimize pain and suffering of injured and their family. True/False?	True
169.	There are laws covering occupational health and safety, and penalties for non-compliance have become quite severe. True/False?	True
170.	What is needed to check all the possible chances of accidents for preventing loss of life and permanent disability?	Industrial safety
171.	Do accidents causing work stoppage and production loss?	Yes
172.	When the chances of injuries are greater?	Material handling when performed manually
173.	Hoisting devices must be equipped with limit switches for preventing loads block from over travelling accidently True/False?	True
174.	During a crane is operated the operator should be entirely guided by the standard signal and both operator and signaler should be trained True/False?	True
175.	When Proper protection against fire and explosion hazards are required?	When fueloperated cranes are used



176.	Where manual loading is done on conveyers which run along vertical path, either partially or totally, safe load sign should be displayed. True/False?	True
177.	Riding on a conveyer should always be prohibited all persons working around conveyer must wear tight clothes and shoes. True/False?	True
178.	What is safety management According to the National Safety Management Society?	Safety management is an integral part of an organization's responsibility, as it displays the company's commitment to the welfare of its employees
179.	What is Safety Management?	It is a function that enhances company performance by predicting operational, procedural, or environmental risks and threats before they occur
180.	To manage safety, it is required to maintain safety data on hazards most of these data is acquired through voluntary and self-reporting. True/False?	True
181.	Data collection is just a step, after that it should be analyzed and information must be generated from it. True/False?	True



182.	Why to investigate of safety occurrences?	To identify the safety deficiencies
183.	Standard procedures should be implemented and maintained through what?	Checklists and briefings.
184.	Do Managing safety is once done activity?	No
185.	Managing safety is an ongoing activity that can be successful only through continuous improvement. True/False?	True