MBA First Year	**Assignment Solution in Production and Operation Management**
Even Semester (Second Semester)	**MBA110**
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Question Number-1.) Discuss basic concept of quality?

Answer-

In Manufacturing, a measure of excellence or state of being free from defects, deficiencies and significant variations. It is brought about by strict and consistent commitment to certain standards that achieve uniformity of a product in order to satisfy specific customer or user requirements.

- The totality of features and characteristics of product or service that bears its ability to satisfy stated or implied needs.

  If an automobile company finds a defect in one of their cars and makes a product recall. Customer reliability and production will decrease because trust will be lost in the cars quality.
- Quality management ensures that an organization, product and service are consistent.
- It has four main components-

  1. Quality Planning
  2. Quality Assurance
  3. Quality Control and
  4. Quality Improvement
- Quality management is focused not only product and service quality but also on the means to achieve it. Quality management, therefore uses, quality assurance and control of processes as well as product has to achieve more consistent quality.
- A Core definition of total quality management describes a management approach to long term success through customer satisfaction. In a TQM effort, all the members of an organization participate in improving processes, product, service and culture, in which they work.

- Total quality management consists of organization wide efforts to install and make permanent climate in which an organization continuously improves its ability to deliver high quality products and services to customer. While there is no widely agreed upon approach, TQM efforts typically draw heavily on the previously developed tools and techniques of quality control.
- Statistical process control is a method of quality control, which employs statistical methods to monitor and control a process. This helps ensure the process operates efficiently, producing more specification confirming product with less waste. Statistical process control can be applied to any process, where the confirming product output can be measured.

Question Number-2.) Describe dimensions of quality with suitable example?

Answer-

- In business, engineering, and manufacturing, quality has a pragmatic interpretation as the non-inferiority or superiority of something; it's also defined as being suitable for its intended purpose (fitness for purpose) while satisfying customer expectations. Quality is a perceptual, conditional, and somewhat subjective attribute and may be understood differently by different people. Consumers may focus on the specification quality of a product/service, or how it compares to competitors in the marketplace. Producers might measure the conformance quality, or degree to which the product/service was produced correctly. Support personnel may measure quality in the degree that a product is reliable, maintainable, or sustainable.
- There are many aspects of quality in a business context, though primary is the idea the business produces something, whether it be a physical good or a particular service. These goods and/or services and how they are produced involve many types of processes, procedures, equipment, personnel, and investments, which all fall under the quality umbrella. Key aspects of quality and how it's diffused throughout the business are rooted in the concept of quality management:
- Quality planning is implemented as a means of "developing the products, systems, and processes needed to meet or exceed customer expectations." This includes defining who the customers are, determining their needs, and developing the tools (systems, processes, etc.) needed to meet those needs.
- Quality assurance is implemented as a means of providing enough confidence that business requirements and goals for a product and/or service

will be fulfilled. This error prevention is done through systematic measurement, comparison with a standard, and monitoring of processes.

- Quality control (QC) is implemented as a means of fulfilling quality requirements, reviewing all factors involved in production. The business confirms that the good or service produced meets organizational goals, often using tools such as operational auditing and inspection. QC is focused on process output.
- Quality improvement is implemented as a means of providing mechanisms for the evaluation and improvement of processes, etc. in the light of their efficiency, effectiveness, and flexibility. This may be done with noticeably significant changes or incrementally via continual improvement.
- While quality management and its tenets are relatively recent phenomena, the idea of quality in business is not new. In the early 1900s, pioneers such as Frederick Winslow Taylor and Henry Ford recognized the limitations of the methods being used in mass production at the time and the subsequent varying quality of output, implementing quality control, inspection, and standardization procedures in their work. Later in the twentieth century, the likes of William Edwards Deming and Joseph M. Juran helped take quality to new heights, initially in Japan and later (in the late '70s and early '80s) globally.

Question Number-3.) Explain Juran's Trilogy?

Answer-

- Juran's Trilogy is an approach to cross functional management that is composed of three managerial processes: Planning, Control and Improvement.
- Quality Planning- Quality planning is the activity of developing the products and processes that required meet the customer demand. It involves a series of universal steps, which can be abbreviated as follows:

1. Establish Quality Goals
2. Identify the customers-those who will be impacted by the efforts to meet the goal
3. Determine the customers need
4. Develop product features, that respond to customer need
5. Develop processes, that can produce those product features
6. Establish process controls and transfer the resulting plans to the operating forces

Quality Control-

This Process consists of the following steps:

1. Evaluate Actual Quality performance
2. Compare actual performance in reference to quality goal
3. Act on the difference

Quality Improvement

This process is the means of raising quality performance to break through levels. The methodology consists of a series of universal steps.

Question Number -4.) Elaborate Deming's Principles?

Answer-

- The concept of the quality is at the core of many of our ideas about effective management and leadership. We know, now that quality needs to be build at every level of company and become part of everything that the organization does.
- Before things like globalization and technological advances become so important, competitive pressures were typically much lower and companies were usually satisfied with focusing their quality efforts on the production process alone. Now the quality is often thought to start and end with customer and all points leading to and from the customer, must aim for high quality service and interaction.
- Deming's message was this, by quality improvement, the company will decrease expense as well increase productivity and market share.

14 Points of Deming's Principle

1.) Create constancy of purpose for improving products and services.

2.) Adopt the new philosophy.

3.) Cease dependence on inspection to achieve quality.

4.) End the practice of awarding business on price alone; instead, minimize total cost by working with a single supplier.

5.) Improve constantly and forever every process for planning, production and service.

6.) Institute training on the job.

7.) Adopt and institute leadership.
8.) Drive out fear.
9.) Break down barriers between staff areas.
10.) Eliminate slogans, exhortations and targets for the workforce.
11.) Eliminate numerical quotas for the workforce and numerical goals for management.
12.) Remove barriers that rob people of pride of workmanship, and eliminate the annual rating or merit system.
13.) Institute a vigorous program of education and self-improvement for everyone.
14.) Put everybody in the company to work accomplishing the transformation.

Question Number-5.) Define quality circles and statistical quality control with examples?

Answer-

Quality Circle-

- Quality circle is a small group of employee working at one place, which come forward voluntarily and discuss their work related once in a week for one hour.
- Workers meet as a group and utilize their inheritability to think for themselves for identifying the constraints being faced by them and pooling their wisdom for final solutions that would improve their work life in general and contribute towards better results for the organization.

Statistical Quality Control

Statistical Quality control is the application of statistical methods for the purpose of determining if a given component of production (input) is within acceptable statistical limits and if there is some result of production (output) that may be shown to be statistically acceptable to required specifications.

Statistical Quality Control provides off-line tools to support analysis and decision-making to help determine if a process is stable and predictable.
The Statistical Quality Control is the application of statistical techniques to measure and improve the quality of processes. Statistical quality control

includes statistical process control, diagnostic tools, sampling plans and other statistical techniques.

The Statistical Quality Control and Statistical Process Control have an effective part in continuously improving a manufacturing process. When measurements are accurately collected and analyzed, improvements are identified and implemented, and controls established to ensure improvements are permanent; a process is well on its way to meeting quality requirements. The Statistical Process Control is the application of statistical techniques for measuring and analyzing the variation in processes.

The Statistical Quality Control provides support analysis and decision-making tools to help determine if a process is stable and predictable from shift to shift, day in and day out, and from supplier to supplier. Using these tools together, users can view the current and long-term picture about processing performance simultaneously.

Statistical Quality Control (SQC) is the term used to describe the set of statistical tools used by quality professionals. SQC is used to analyze the quality problems and solve them.

Statistical quality control refers to the use of statistical methods in the monitoring and maintaining of the quality of products and services.

All the tools of SQC are helpful in evaluating the quality of services. SQC uses different tools to analyze quality problem.

1) Descriptive Statistics
2) Statistical Process Control (SPC)
3) Acceptance Sampling

Descriptive Statistics involves describing quality characteristics and relationships. SPC involves inspect random sample of output from process for characteristic. Acceptance Sampling involves batch sampling by inspection.

Objective of Statistical Quality Control

Quality Control is very important for a every company. Quality control includes service quality given to customer, company management

leadership, commitment of management, continuous improvement, fast response, actions based on facts, employee participation and a quality driven culture.

The main objectives of the quality control module are to control of material reception, internal rejections, clients, claims, providers and evaluations of the same corrective actions are related to their follow-up. These systems and methods guide all quality activities. The development and use of performance indicators is linked, directly or indirectly,to customer requirements and satisfaction, and to management.

Question Number-6.) Discuss seven Quality Control tools and New Quality control tools?

Answer-

The Seven Basic Tools of Quality (also known as 7 QC Tools) originated in Japan when the country was undergoing major quality revolution and had become a mandatory topic as part of Japanese's industrial training program. These tools which comprised of simple graphical and statistical techniques were helpful in solving critical quality related issues. These tools were often referred as ***Seven Basics Tools of Quality*** because these tools could be implemented by any person with very basic training in statistics and were simple to apply to solve quality-related complex issues.

Quality pros have many names for these seven basic tools of quality, first emphasized by Kaoru Ishikawa, a professor of engineering at Tokyo University and the father of "quality circles." Start your quality journey by mastering these tools, and you'll have a name for them too: indispensable.

7 QC tools can be applied across any industry starting from product development phase till delivery. 7QC tools even today owns the same popularity and is extensively used in various phases of Six Sigma (DMAIC or DMADV), in continuous improvement process (PDCA cycle) and Lean management (removing wastes from process).

1.) **Cause-and-effect diagram** (also called Ishikawa or fishbone diagrams): Identifies many possible causes for an effect or problem and sorts ideas into useful categories.

Cause–and–effect diagram introduced by **Kaoru Ishikawa** helps in identifying the various causes (or factors) leading to an effect (or problem) and also helps in deriving meaningful relationship between them.

Once a quality related problem is defined, the factors leading to the causal of the problem are identified. We further keep identifying the sub factors leading to the causal of identified factors till we are able to identify the root cause of the problem. As a result we get a diagram with branches and sub branches of causal factors resembling to a fish bone diagram.

2.) **Check sheet**: A structured, prepared form for collecting and analyzing data; a generic tool that can be adapted for a wide variety of purposes.

A check sheet can be metrics, structured table or form for collecting data and analyzing them. When the information collected is quantitative in nature, the check sheet can also be called as **tally sheet**.

3.) **Control chart**: Graph used to study how a process changes over time. Comparing current data to historical control limits leads to conclusions about whether the process variation is consistent (in control) or is unpredictable (out of control, affected by special causes of variation).

4.) **Histogram**: The most commonly used graph for showing frequency distributions, or how often each different value in a set of data occurs.

Histogram introduced by ***Karl Pearson*** is a bar graph representing the frequency distribution on each bars.

The very purpose of Histogram is to study the density of data in any given distribution and understand the factors or data that repeat more often.

Histogram helps in prioritizing factors and identify which are the areas that needs utmost attention immediately.

5.) **Pareto chart**: A bar graph that shows which factors are more significant.

Pareto chart is named after **Vilfredo Pareto**. Pareto chart revolves around the concept of 80-20 rule which underlines that in any process, 80% of problem or failure is just caused by 20% of few major factors which are often referred as **Vital Few**, whereas remaining 20% of problem or failure is caused by 80% of many minor factors which are also referred as **Trivial Many**.

The very purpose of Pareto Chart is to highlight the most important factors that are the reason for major cause of problem or failure.

Pareto chart is having bars graphs and line graphs where individual factors are represented by a bar graph in descending order of their impact and the cumulative total is shown by a line graph.

6.) **Scatter diagram**: Graphs pairs of numerical data, one variable on each axis, to look for a relationship.

Scatter diagram or scatter plot is basically a statistical tool that depicts dependent variables on Y – Axis and Independent Variable on X – axis plotted as dots on their common intersection points. Joining these dots can highlight any existing relationship among these variables or an equation in format **Y = F(X) + C**, where is **C is an arbitrary constant**.

Very purpose of scatter Diagram is to establish a relationship between problem (overall effect) and causes that are affecting.

The relationship can be linear, curvilinear, exponential, logarithmic, quadratic, polynomial etc. Stronger the correlation, stronger the relationship will hold true. The variables can be positively or negatively related defined by the slope of equation derived from the scatter diagram.

7.) **Stratification**: A technique that separates data gathered from a variety of sources so that patterns can be seen (some lists replace stratification with flowchart or run chat).

Stratification is a method of dividing data into sub–categories and classifies data based on group, division, class or levels that helps in deriving meaningful information to understand an existing problem. The very purpose of Stratification is to divide the data and conquer the meaning full Information to solve a problem.

Question Number-7.) Discuss Six Sigma and total productive maintenance?

Answer-

Six Sigma is a method that provides organizations tools to improve the capability of their business processes. This increase in performance and

decrease in process variation helps lead to defect reduction and improvement in profits, employee morale, and quality of products or services.

Six Sigma (**6σ**) is a set of techniques and tools for process improvement. It was introduced by American engineer Bill Smith while working at Motorola in 1986. Jack Welch made it central to his business strategy at General Electric in 1995. A six sigma process is one in which 99.99966% of all opportunities to produce some feature of a part are statistically expected to be free of defects.

Six Sigma strategies seek to improve the quality of the output of a process by identifying and removing the causes of defects and minimizing impact variability in manufacturing and business processes. It uses a set of quality management methods, mainly empirical, statistical methods, and creates a special infrastructure of people within the organization who are experts in these methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and has specific value targets, for example: reduce process cycle time, reduce pollution, reduce costs, increase customer satisfaction, and increase profits.

The term *Six Sigma* (capitalized because it was written that way when registered as a Motorola trademark on December 28, 1993) originated from terminology associated with statistical modeling of manufacturing processes. The maturity of a manufacturing process can be described by a *sigma* rating indicating its yield or the percentage of defect-free products it creates—specifically, to within how many standard deviations of a normal distribution the fraction of defect-free outcomes corresponds. Motorola set a goal of "six sigma" for all of its manufacturing.

Total Productive Maintenance (**TPM**) is a system of maintaining and improving the integrity of production, safety and quality systems through the machines, equipment, processes, and employees that add business value to an organization.

TPM focuses on keeping all equipment in top working condition to avoid breakdowns and delays in manufacturing processes.

The goal of TPM is the continuous improvement of equipment effectiveness through engaging those that impact on it in small group improvement activities. Total quality management (TQM) and total productive maintenance (TPM) are considered as the key operational activities of the

quality management system. In order for TPM to be effective, the full support of the total workforce is required. This should result in accomplishing the goal of TPM: "Enhance the volume of the production, employee morals, and job satisfaction."

The main objective of TPM is to increase the Overall Equipment Effectiveness (OEE) of plant equipment. TPM addresses the causes for accelerated deterioration while creating the correct environment between operators and equipment to create ownership.

Question Number-8.) Describe ISO 9000 and coverage QS 9000 clauses in detail?

Answer-

The **ISO 9000** family of quality management systems (QMS) is a set of standards that helps organizations ensure they meet customers and other stakeholder needs within statutory and regulatory requirements related to a product or service. ISO 9000 deals with the fundamentals of quality management systems, including the seven quality management principles that underlie the family of standards. ISO 9001 deals with the requirements that organizations wishing to meet the standard must fulfill.

ISO 9000 is a series of standards, developed and published by the International Organization for Standardization (ISO), that define, establish, and maintain an effective quality assurance system for manufacturing and service industries. The ISO 9000 standard is the most widely known and has perhaps had the most impact of the 13,000 standards published by the ISO. It serves many different industries and organizations as a guide to quality products, service, and management.

An organization can be ISO 9000-certified if it successfully follows the ISO 9000 standards for its industry. In order to be certified, the organization must submit to an examination by an outside assessor. The assessor interviews staff members to ensure that they understand their part in complying with the ISO 9000 standard, and the assessor examines the organization's paperwork to ensure ISO 9000 compliance. The assessor then prepares a detailed report that describes the parts of the standard the organization missed. The organization then agrees to correct any problems within a specific time frame. When all problems are corrected, the

organization can then be certified. Today, there are approximately 350,000 ISO 9000-certified organizations in over 150 countries.

The ISO 9000 series was created by the International Organization for Standardization (ISO) as international requirements and guidelines for quality management systems. It was originally introduced in 1987 and over the years has established itself in the global economy having been adopted in over 178 countries with over one million registrations.

The phrase “ISO 9000 family” or “ISO 9000 series” refers to a group of quality management standards which are process standards (not product standards).

The ISO 9000 Series of Quality Standards is not industry specific and is applicable to any manufacturing, distribution or service organization. It is managed by Technical Committee (TC) 176, comprised of international members from many industries and backgrounds.

- **ISO 9001:1994** Model for quality assurance in design, development, production, installation, and servicing was for companies and organizations whose activities included the creation of new products.

- **ISO 9002:1994** Model for quality assurance in production, installation, and servicing had basically the same material as ISO 9001 but without covering the creation of new products.

- **ISO 9003:1994** Model for quality assurance in final inspection and test covered only the final inspection of finished product, with no concern for how the product was produced.