PAPER SOLUTION OF ***T Q M (RME 085)***

ANS 1 (a) Factors controlling quality of design are – 1- Types of customers in market.(a) consuming habits of people (b) The price they are willing to pay (c) The choice of design of product.2-Profit consideration 3- Environmental condition 4- Special requirements of the product.

ANS1(b) TQM is management approach of organization, centered on quality, based on participation of all its members and aiming at long term success through customer satisfaction and benefits to the members of organization and society.

ANS1(c) Steps in quality control program are –

1. Formulate quality policy.
2. Work out details of product requirements, set the standards (specifications) on the basis of customers preference, cost and profit.
3. Select inspection plan and set up procedure for checking
4. Detect deviations from set standards or specifications.
5. Take corrective action through proper authority and make necessary changes to achieve standards.
6. Decide on salvage method i. E. To decide how the defective parts are disposed of, entire scrap or rework.
7. Co-ordination of quality problems.
8. Developing quality consciousness in the organization. Quality control is not a function of any single department or a person. It is the primary responsibility of any supervisor to turn out work of acceptable quality.

ANS1(d) i- Process flow chart
ii- Cause and effect diagram
iii- Tally Sheet
iv- Pareto diagram
v- Scatter diagram
vi- Histogram
vii- Control Chart

ANS 1(e) The fundamental requirement of any process is that it should be stable first. Stability is indicated by consistent performance of the process within the limits set. Only variations are allowed the common cause variations. Therefore, statistical control implies performance of the process within the set limits. Only thereafter, the process will be predictable. Therefore, capability can be assessed only on a process, which is consistently stable over a period of time.

ANS 2 (a) 1. Start with building awareness of the need and opportunity for improvement.
2. Set realistic goals for improvement.
3. Organize to reach the goals by methods to establish a quality council, identify problems, select projects, appoint teams, designate facilities.
4. Provide training.
5. Carry out projects to solve problems.
6. Report progress.
7. Give recognition to any body who achieves.
8. Communicate results to all concerned. ,

9. Keep score by being quantitative. .

10. Maintain a regular momentum by making annual improvement part of the sustenis and process of the company.

ANS 2 (b) JIT production technique uses containers for holding parts. This allows easy identification and monitoring of inventory levels.

Benefits of JIT :

(1) Reduction of wastes (defects , scrap and rework) and increased ability to remain competitive through customer focus and delivering superior performance of both goods and / or services in terms of cost service and quality .

(2) There is a massive reduction in work - in - process which results in lower space requirements .

(3) Stronger and more reliable working relations with suppliers .

(4) Higher profits , reduction in lead time to customer and improved customer satisfaction .

(5) Improved working relations between employees .

| (6) Less inventory of raw materials .

(7) Increased flexibility , lower costs and higher productivity .

(8) Improved quality .

ANS 2 (c) i- Customer satisfaction

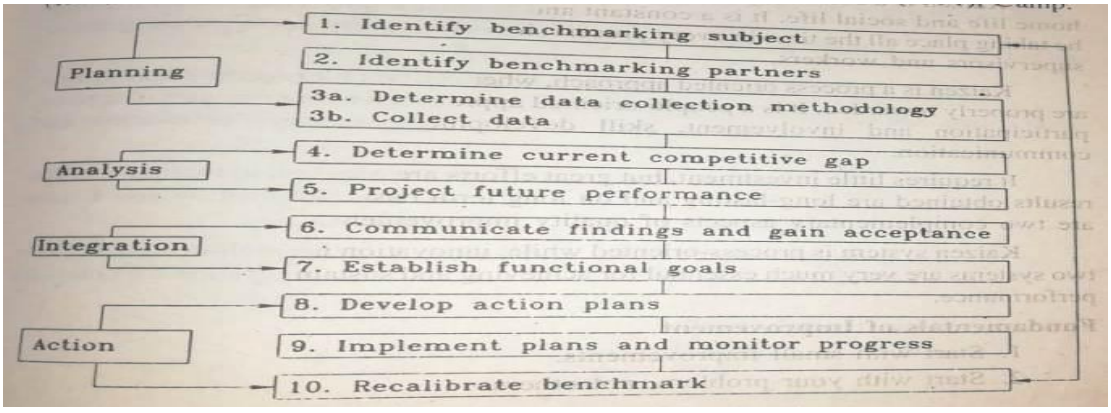
a) Fitness for use
b) Reliability
c) Durability
d) Foolproof workability
e) Maintainability
f) Aesthetic look

ii- Do it right first time

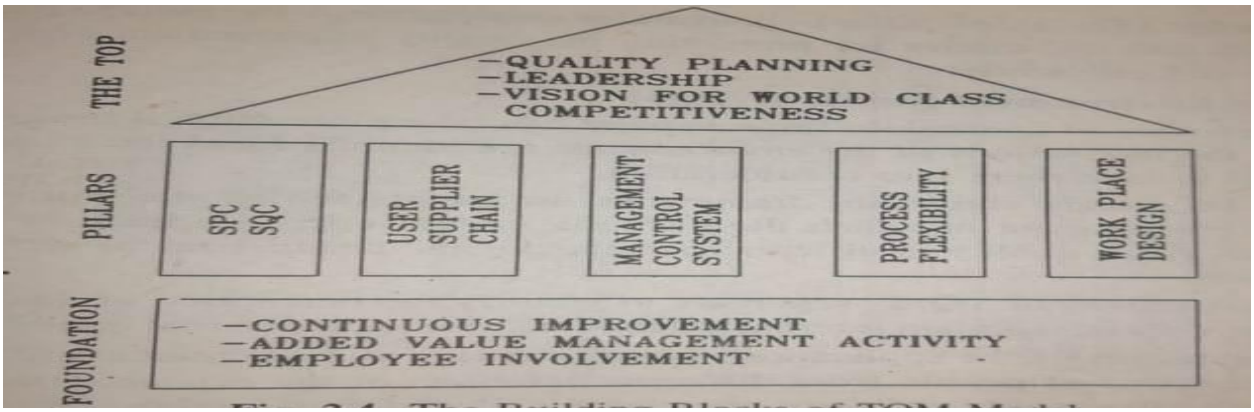
iii- Continuous improvement

iv- employee involvement

ANS 2 (d) Definitions Benchmarking is a Systematic and Continuous Measurement Process of Continuously Measuring and Comparing An Organization 'Business Process Against Business Leaders Anywhere in the world.



ANS 3 (a) **The House of TQM Model** : The House of TQM model was proposed by Kano in 1993. It shows the structure of TQM and quality sweating theory for introducing TQM. In the house of TQM, the portion from the floor up to the roof is TQM. The floor signifies "motivational approach" and the roof shows "customer satisfaction / quality assurance", which is the aim of TQM. The three pillars of the house of TOM model are concepts, techniques and vehicles.



ANS 3 (b)

Solution. Σnp = total number of defective = 66

Σn = total number inspected = $400 \times 15 = 6{,}000$

$$\bar{p} = \frac{\Sigma np}{\Sigma n} = \frac{66}{6000} = 0.011$$

$$n\bar{p} = 400 \times 0.011 = 4.4$$

$$UCL_{np} = n\bar{p} + 3\sqrt{n\bar{p}\,(1-\bar{p})}$$

$$= 4.4 + 3\sqrt{4.4(0-989)}$$

$$= 4.4 + 6.25 = 10.65$$

$$LCC_{np} = 4.4 - 6.25 = \text{negative} = 0.$$

It is observed that the lot numbers 4 and 9 falls out of control. Therefore, the process is not in statistical control.

ANS 4 (a)

	Variable Charts	*Attribute Charts*
1.	Example : $\bar{X}$, R, σ charts.	P, np, C, u charts.
2.	Type of data required : variables data (Measured values of characteristics.)	Attribute data (using Go-No-Go gauges).
3.	**Field of application** Control of individual characteristics.	Control of proportion of defectives or number of defects or number of defects per unit.
4.	**Advantages** (*a*) Provides maximum utilization of information available from data. (*b*) Provides details information on process average and variation for control of individual dimensions.	(*a*) Data required are often already available from inspection records. (*b*) Easily understood by all persons. Since, it is more simple as compared to $\bar{X}$ and R chart. (*c*) It provides over all picture of quality history.
5.	**Disadvantages** (*a*) They are not easily understood unless training is provided. (*b*) Can cause confusion between control limits and specification limits. (*c*) Cannot be used with go-no-go type gauge inspection.	(*a*) They do not provide detailed information for control of individual characteristic. (*b*) They do not recognize different degree of defectiveness. (Weightage of defects).

ANS 4 (b)

Solution. $\bar{C} = \frac{\Sigma C}{N} = \frac{351}{25} = 14.04$

$$UCL_C = \bar{C} + 3\sqrt{C} = 14.04 + 3\sqrt{14.04}$$
$$= 14.04 + 11.24 = 25.28.$$
$$LCL_C = \bar{C} - 3\sqrt{C} = 14.04 - 11.24 = 2.80$$

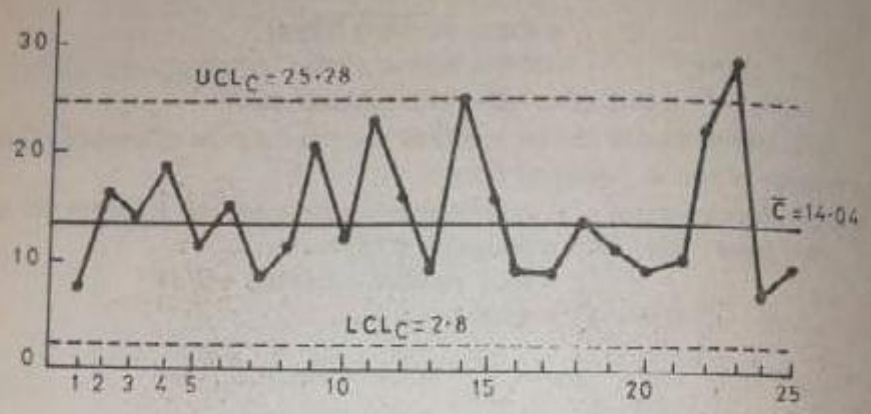


Fig. 8.2. *C* chart.

Now, the number of missing rivets of air plane number 24 = 28 which falls above the upper control limit. Therefore, to suggest value of C' for subsequent period we have to revise the limits by removing this reading.

For now C, $\bar{C} = \frac{351 - 28}{24} = 13.458$

Now $$UCL = \bar{C} + 3\sqrt{C} = 13.458 + 3\sqrt{13.458}$$
$$= 13.458 + 11.005 = 24.463$$
$$LCL = 13.458 - 11.005 = 2.453.$$

Now, again the reading for air plane number 14 = 25 goes out of control. Therefore, we have to revise the control limits again.

$$\bar{C} = \frac{323 - 25}{23} = 12.956$$

$$UCL = 12.956 + 3\sqrt{12.956} = 23.754$$

$$LCL = 12.956 - 3\sqrt{12.956} = 2.158.$$

Now, all points are within control limits, therefore, value of C' suggested subsequent period

$$C' = \bar{C} = 12.956.$$

ANS 5 (a) TQM is a dynamic concept, it strives for ever better quality. TQM practitioners view quality as an endless journey, not a final destination. They are always experimenting, adjusting and improving. They search for potential and actual troble spots for improvement of product design and processes. Dynamic organizations make continuous improvement a way of life.

KAIZEN is a Japanese word KAI and ZEN. KAI means change and Zen means better. KAIZEN means change for better. It implies continuous improvement:

i- Consistently
ii- Every time
iii- Every step and
iv- Every place, leading to self-development.

5-S is a house keeping technique

i- Seri (means straighten up)
ii- Seiton (means put things in order)
iii- Seiso (means clean up)
iv- Seiketsu (means personal cleanliness)
v- Shitsuke (means discipline)

ANS 5(b)

The term " Quality Mindness" means person's attitude towards quality. To maintain quality or to improve quality it is necessary to stress the importance of quality in the minds of the various person working in the organization (managers, foremen, supervisors, workers etc.)