

**TOTAL QUALITY MANAGEMENT (TQM)  
(MECH 3141)**

**Time Allotted : 3 hrs**

**Full Marks : 70**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

**Group - A  
(Multiple Choice Type Questions)**

- Choose the correct alternative for the following: **10 × 1 = 10**
  - After the World War II, Japanese product quality started to improve faster mainly due to
    - massive quality related training program
    - annual programs of quality improvement
    - upper management leadership of the quality function
    - all of the above.
  - Process capability index is defined as
 

(a) $\frac{USL - LSL}{6\sigma}$	(b) $\frac{USL + LSL}{6\sigma}$
(c) $\frac{USL + LSL}{3\sigma}$	(d) $\frac{USL - LSL}{3\sigma}$
  - The costs associated with defective products produced come under
 

(a) cost of prevention	(b) cost of internal failure
(c) cost of external failure	(d) cost of appraisal.
  - A systematic and independent examination to determine whether quality activities and related results comply with planned arrangements is called
 

(a) quality planning	(b) quality audit
(c) maintenance audit	(d) none of these.
  - The success of sampling inspection depends upon
 

(a) sample size	(b) lot size
(c) acceptance number	(d) all the above.
  - The objective of Quality Function Deployment is
    - to improve product development cycle
    - to improve quality of the product
    - to develop product at lower cost
    - all of these.

- Which one of the following is not a cost of non-conformance
 

(a) quality training	(b) rework
(c) scrap	(d) warranty cost.
- $\bar{X}$  and R charts are used to find out
 

(a) material control	(b) production control
(c) cost control	(d) process control.
- If the lower control limit of a "p" chart has a negative value, it is
 

(a) eliminated from the chart	(b) treated as negative only
(c) equated to zero	(d) considered as LCL.
- Need for change in ISO 9000:1994 version was felt because
  - it was too bureaucratic
  - continuous improvement was not embedded in the standard
  - customer satisfaction was not addressed
  - all of these.

**Group - B**

- What is the difference between Quality Control and Quality Assurance? Quality or Brand Value of an organisation is a top down approach – explain the statement in brief.
  - Write short notes on the following Quality Gurus with respect to their country of origin and their contribution towards enhancement of quality: (i) Edward Deming (ii) Joseph Juran (iii) Philip Crosby.  
**(3 + 3) + 6 = 12**
- Define quality cost. What are the different categories of Quality costs? Briefly discuss about the Internal Failure costs.
  - Discuss briefly the barriers to implementing TQM in an organisation.  
**(1 + 1 + 4) + 6 = 12**

**Group - C**

- Briefly describe the purpose of an ISO 9000 quality system.
  - Mention the general requirements that are necessary to maintain Quality Management System.  
**6 + 6 = 12**
- Define the following terms as stated in glossary of ISO 9000. (i) Quality (ii) Quality Assurance (iii) Quality Audit (iv) Quality Policy

- (b) What are the mandatory environmental disclosures that must be displayed by a thermal power plant in West Bengal?

**6 + 6 = 12**

**Group - D**

6. (a) Explain the following QC tools used for improving the quality of an organisation:

(i) Fishbone diagram (ii) Scatter diagram (iii) Pareto analysis.

- (b) A multi speciality hospital invited customer complaint to improve the service quality. The data received are as follows:

Complaint 1	Rude behaviour of the officials	320
Complaint 2	Doctors not available for clarification	60
Complaint 3	Negligence of treating patients	260
Complaint 4	Sub standard food	430
Complaint 5	Multiple point of contact for different issues for the same patient	45
Complaint 6	waiting hall capacity too small	60
Complaint 7	Toilets are too dirty	70

With the help of Pareto Chart identify the VITAL FEW problems which constitute at least 80% of the customer complaints.

**6 + 6 = 12**

7. (a) What are the seven QC tools? Briefly describe any two of them.

- (b) What is meant by QFD? Mention the benefits of QFD.

**6 + 6 = 12**

**Group - E**

8. (a) Plot the control chart for  $\bar{X}$  and R, using the following sample data and a sample size of 5. From the chart state if the process is in control.

Sub Group No.	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	5.004	5.204	5.014	5.008	5.009	5.016	5.030	5.010	5.016	5.010
R	0.02	0.08	0.03	0.05	0.04	0.09	0.04	0.04	0.05	0.07

- (b) In a manufacturing process the no. of defectives found in the inspection of 20 lots of 100 samples as given below (i) Determine the control limits of p-chart and state if the process is in control. (ii) Determine the new value of mean fraction defective if some points are out of control. Compute the corresponding limits and state if the process is still in control.

Lot No	No. of defectives	Lot No	No. of defectives
1	5	11	7
2	4	12	6
3	3	13	3
4	5	14	5
5	4	15	4
6	6	16	2
7	9	17	8
8	15	18	7
9	11	19	6
10	6	20	4

**6 + 6 = 12**

9. (a) When would you use the following control charts: (i) number defective chart, (ii) fraction defective chart (iii) defect chart.

- (b) Six consecutive lots received from a vendor were inspected by sampling process by the inward inspection of the buyer. The sample size was varied as per variations in the lot size. The number of defectives of each sample were recorded as under:

Sample No.	1	2	3	4	5	6
Lot Size	2850	1860	480	970	4385	2568
Sample Size	125	125	50	80	200	125
No. of defectives	1	3	-	2	4	1

Construct a control chart for fraction defectives and number of defectives.

**6 + 6 = 12**