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)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Control Chart is a
(a) process monitoring tool (b) process control tool
(c) both (a) & (b) (d) none of the above.

(ii) Zero defect
(a) is a management philosophy which tolerates no defect knowingly
(b) refers only to accepting only good material from the vendor
(c) means prevention of occurrence of fault in the first place
(d) all of these.

(iii) Quality management system which is a model for quality assurance in design, development, production, installation and servicing is
(a) ISO 9000 (b) ISO 9001
(c) ISO 9002 (d) ISO 9003.

(iv) An OC curve in Acceptance sampling shows
(a) AOQ vs Rejection probability
(b) Acceptance probability vs Lot quality
(c) AOQL vs AOQ
(d) Acceptance probability vs Rejection probability.

(v) What is Quality Assurance?
(a) Quality assurance deals with activities which prove that products and services meet the required quality standard
(b) Quality assurance deals with activities which aim at customer's satisfaction
(c) Quality assurance deals with controlling the quality of products by inspection
(d) All of the above.

(vi) Quality Circle
(a) is the boundary beyond which product quality can be improved
(b) brings better human relations with top management in their combined commitment to quality
(c) is essential to get ISO 9000 series certification
(d) all of these.

(vii) With six sigma, the common measurement index is
(a) process capability (b) quality characteristic
(c) defect per unit (d) none of the above.

(viii) How to reduce the cost of quality?
(a) By increasing the degree of conformance
(b) By decreasing cost of failure
(c) Both (a) and (b)
(d) By decreasing cost of appraisal.

(ix) 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) $\frac{USL-LSL}{3\sigma}$

(x) If the lower control limit of a "p" chart has a negative value, it is
(a) eliminated from the chart (b) equated to zero
(c) treated as negative (d) considered as upper control limit.

Group – B

2. (a) Distinguish between the terms 'TQM" and "TPM" with relevant examples.

(b) Briefly discuss the barriers towards implementing TQM in an organization. **6 + 6 = 12**

3. (a) Define the terms 'Quality of design', 'Quality of conformance' and 'Quality of performance'.

(b) Write a short note on the various quality costs and their measurements. **6 + 6 = 12**

Group – C

4. (a) What do you understand by ISO 9000? Describe in brief the purpose of ISO 9000 quality system.

(b) Mention the steps that are necessary to implement a QMS effectively. **(2 + 4) + 6 = 12**

5. (a) Illustrate the general guideline on principles, systems and supporting techniques for implementing "EMS".

   (b) Discuss briefly the benefits of ISO 14000.

6 + 6 = 12

Group – D

6. (a) What is meant by the term KAIZEN? Mention briefly the elements that are associated with 5-S Principles.

   (b) Write short notes on: (i) P-D-C-A Cycle (ii) Cause and Effect diagram.

(2 + 4) + (3 + 3) = 12

7. (a) What is meant by the term QCC? Briefly mention the important considerations that are required to install QCC in an organization.

   (b) Explain in brief the process of QFD and it's benefits.

(2 + 4) + 6 = 12

Group – E

8. (a) What is Statistical Process Control? What are the various types of control charts?

   (b) Determine the control limits for X and R charts if $\sum X = 357.50$, $\sum R = 9.90$, Number of subgroups = 20. It is given that $A_2 = 0.18$, $D_3 = 0.41$, $D_4 = 1{\cdot}59$, $d_2 = 3.735$. Also find the process capability.

(1 + 2) + 9 = 12

9. (a) Draw a suitable control chart for the following data pertaining to the number of foreign coloured threads (considered as defects) in 15 pieces of cloth of 2 m × 2 m in a certain make of synthetic fibre and state your conclusions.
   7, 12, 3, 20, 21, 5, 4, 3, 10, 8, 0, 9, 6, 7, 20.

   (b) The design specifications for a component are 100±0.5 mm, whereas the process report shows that process average is 99.9 mm and standard deviation is 0.18. Do these figures call for any action by anybody? What action is necessary and by whom?

6 + 6 = 12