

**TOTAL QUALITY MANAGEMENT (TQM)**  
**(MECH 3236)**

**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) Total Quality Assurance is the aggregate of – quality of design, quality of conformance and  
(a) quality audit (b) quality of performance  
(c) in-process inspection (d) quality planning.
- (ii) The maximum percent defective that the consumer finds definitely acceptable is called  
(a) AOQL (b) LTPD (c) AQL (d) AOQ.
- (iii) To initiate total quality management, an organization must establish a culture based on  
(a) customer satisfaction (b) continuous improvement  
(c) leadership (d) team work.
- (iv) Which Quality Guru's work is based on "theory of variance?"  
(a) Juran (b) Crosby  
(c) Deming (d) Taguchi.
- (v) Factors that lead to customer satisfaction are  
(a) commitment to customer and customer focus service standards  
(b) training and employment  
(c) effective complaint management  
(d) all of the above.
- (vi) The control chart for number of defects per sample is  
(a) p-chart (b) np-chart  
(c) C-chart (d) R-chart.
- (vii) The success of a sampling inspection depends upon  
(a) sample size (b) lot size  
(c) acceptance number (d) all of the above.

- (viii) ISO 9001 quality systems is applicable for  
(a) production and installation  
(b) design and production  
(c) final inspection and testing  
(d) design / development , production, installation & servicing.
- (ix) When process capability is more than the specified tolerance, rejections are  
(a) less (b) very high  
(c) high (d) nil.
- (x) Which quality management programme is related to the maintenance of plants and equipments?  
(a) Environmental management systems (b) Fault tree analysis  
(c) Failure mode effect analysis (d) Total productive maintenance.

### **Group- B**

2. (a) Distinguish between Quality Control and Inspection. *[[CO1)(Understand)/LOCQ]]*  
(b) How does “Employee Involvement” improve the quality aspects in an organization? *[[CO1)(Remember)/LOCQ]]*  
**6+ 6 = 12**
3. (a) Briefly explain the methods that are followed for “Customer Satisfaction”.  
*[[CO1)(Understand)/LOCQ]]*  
(b) Narrate briefly the necessity of “Customer Retention” in an established organization.  
*[[CO1)(Remember)/LOCQ]]*  
**6 + 6 = 12**

### **Group - C**

4. (a) What is quality policy of an organisation? Who spells out the quality policy? What is the role of MR? What is adequacy report? What is NCR? In how many types NCRs are classified?  
*[[CO5)(Remember)/LOCQ]]*  
(b) Describe the procedure of implementing ISO 9000 in an organisation.  
*[[CO5)(Analyse/IOCQ]]*  
**(1 + 1 + 1 + 1 + 1 + 1) + 6 = 12**
5. (a) What is the purpose of management review meeting? Who is responsible for closure of various NCRs found during audit? Name few parameters by which continuous improvement in maintenance department is assessed by an auditor.  
*[[CO5)(Analyse/IOCQ]]*  
(b) What are the issues that are considered in identification and evaluation of environmental impacts of an organisation?  
*[[CO5)(Understand)/LOCQ]]*  
**(1 + 1 + 4) + 6 = 12**

**Group D**

6. (a) Explain the following QC tools used for improving the quality of an organization:  
 (i) Pareto Analysis (ii) Cause and Effect Diagram (iii) Scatter Diagram. [[CO2](Analyze)/IOCQ]]  
 (b) Illustrate the characteristics of Quality Circles as a management tool for improving quality. [[CO2](Understand/LOCQ)]  
**6 + 6 = 12**
7. (a) Mention the advantages of QFD. [[CO3](Understand/IOCQ)]  
 (b) Briefly discuss the concept of PDCA cycle for continuous improvement in quality as modified by Deming. [[CO2](Understand/LOCQ)]  
**6 + 6 = 12**

**Group - E**

8. (a) Outline the concept of Six-Sigma Process Capability. [[CO4](Remember/HOCQ)]  
 (b) 10 samples, each of size 50 of a pipe were inspected in pressure testing. The results of the inspection are given below:
- |                |   |   |   |   |   |   |   |   |   |    |
|----------------|---|---|---|---|---|---|---|---|---|----|
| Sample No.     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| No. Of Defects | 2 | 3 | 2 | 0 | 2 | 3 | 2 | 1 | 2 | 3  |
- Draw a p-chart and state your comments. [[CO4](Evaluate/HOCQ)]  
**6 + 6 = 12**
9. (a) Draw an OC Curve showing different regions with their characteristics. [[CO4](Understand)/IOCQ]]  
 (b) Twenty five –engine mounts are sampled each day and found to have an average width of 2 inches, with a standard deviation of 0.1 inch. What are the control limits that include 99.73% of the samples mean? [[CO4](Evaluate)/IOCQ]]  
**6 + 6 = 12**

<i>Cognition Level</i>	<i>LOCQ</i>	<i>IOCQ</i>	<i>HOCQ</i>
<i>Percentage distribution</i>	50	37.5	12.5

**Course Outcome (CO):**

At the end of the course, a student will be able to

- CO 1:** Define and measure quality, distinguish between quality control and quality assurance  
**CO 2:** Explain various quality control tools and their uses to improve quality  
**CO 3:** Differentiate between product quality and system quality, awareness of various ISO 9000 system standard  
**CO 4:** Understand the importance of ISO 14000 environment management system and its implication

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**CO 5:** Apply various quality control charts, operating characteristics curve for quality improvement

**CO 6:** Define process capability, apply the principles of design of experiments, Taguchi Methodology and six sigma

*\*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.*