B.TECH/CHE/8TH SEM/CHEN 4242/2019
TOTAL QUALITY MANAGEMENT
(CHEN 4242)

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) What is the primary goal of quality improvement in an organisation
(a) Better specification of the product or service delivered by the organisation
(b) Customer's satisfaction
(c) Low cost for the product or service
(d) Increasing profit of the organisation.

(ii) Pareto analysis is done to
(a) identify the root cause of the problem in any process/product/service
(b) identify the vital few factors for majority of the problem
(c) sort out the mostly deviated factors from the common ones
(d) segregate the economic factors from the total number of factors.

(iii) Fish-bone diagram is used for the propose of
(a) Work-study & motion-study
(b) Finding out the root cause/s of the particular problem
(c) Estimating the weightage of the individual factors
(d) Sorting out major factors responsible for a particular problem.

(iv) The 6σ spread between the control limits in process control chart corresponds to the measure of conformance as
(a) 95.5% (b) 99.73% (c) 98.55% (d) 100%.

(v) The term Quality (Q) is related to performance (P) of the product and expectation of the customer (E) as under
(a) $P \times E$ (b) P/E (c) E/P (d) P + E.

(vi) Six Sigma methodology, a statistical quality control technique for achieving quality objective is applicable to
(a) Conformance to internal requirement (b) Testing procedures
(c) Process improvement (d) Measuring instruments.

(vii) In relation to quality management programme, Kaizen is the word used to mean:
(a) Just in time (b) Continuous Improvement
(c) Systematic process (d) Random Sampling.

(viii) In drawing a Quality Control chart for number of defectives (attribute), the control limits are computed based on
(a) Gaussian distribution (b) Chi-square distribution
(c) Poisson distribution (d) Binomial distribution.

(ix) The Quality implementation steps in Japan uses the terminology 'Kaizen' meaning thereby
(a) Continuous Process Improvement
(b) Things will work as they are supposed to
(c) Examining the way the user applies the product
(d) Things should have an aesthetic quality.

(x) The range of the subgroup of data 2, 0, 4, 5, -1, 6 is
(a) 8 (b) 5 (c) 7 (d) 6.

Group – B

2.(a) Explain the 80-20 rule in regard to the usefulness of Pareto diagram for problem solving with an example.

(b) Draw a fish-bone diagram for the resolving the problem of manufacturing defect in a product with example.

6 + 6 = 12

3.(a) Draw a frequency distribution curve on the data collected for the length in mm scale of the entire lot of 20 bolts produced by a producer as under: 7, 8, 10, 13, 11, 12,13, 12, 11, 10, 9, 8, 10, 7, 8, 11, 12, 9,11, 8, Check the process capability of the production process subject to the customer's specification of 10 ± 0.5 mm.

(b) Draw and explain a process control chart with usual notations of the parameters used for identifying the assignable (special) and non-assignable (common) causes of variations in a process.

6 + 6 = 12

Group – C

4. (a) Draw and explain a process control chart with usual notations of the parameters used for identifying the assignable (special) and non-assignable (common) causes of variations in a process.

(b) How would enumerate the role of suppliers of input materials into the manufacturing process in generating output quality for customers' satisfaction?

6 + 6 = 12

5. (a) What is the objective of Pareto analysis?

(b) Analyse the following data table following the method of Pareto analysis by pictorially presenting the derived information from the data to identify the vital 20% causes that need to be taken care of to bring about an 80% overall improvement.

Causes	Frequency in %	Cumulative Frequency in %
Technical Failure	42	42
Workforce Problems	35	77
Environmental Factors	12	89
Shortage of resources	8	97
Government Approval	3	100

4 + 8 = 12

Group – D

6. (a) What do you understand by Business Process Benchmarking?

(b) Explain Deming Cycle: The Wheel of Continuous Improvement in relation to quality improvement.

(c) What are Sampling and Non-Sampling errors?

4 + 4 + 4 = 12

7. (a) Narrate and illustrate the differences between TQM and 6 σ, where σ stands for estimate of standard deviation of the population of data.

(b) What is the significance of control limits in a Process Control Chart?

8 + 4 = 12

Group – E

8. (a) In planning an acceptance sampling scheme, the Producer and Consumer have agreed that the acceptable quality level is 2% defectives and the unacceptable level is 6%; each is prepared to take a 10% risk. What sample size is required and under what circumstances should the batch be rejected?

(b) Express the term Reliability, R(t) of a product or service in terms of probability density function of survival over time, f(t) and probability of failure i.e., hazard function, h(t).

6 + 6 = 12

9. (a) Write short notes on the following:
i) Producer's risk & Consumer's risk;
ii) Acceptance sampling

(b) Name some important members of ISO-9000 family of standards with due mention of the area of their functioning.

(4 + 4) + 4 = 12