B.TECH/ BT/ CE/ EE /8TH SEM/ CHEN 4282/2018

TOTAL QUALITY MANAGEMENT & ASSURANCE
(CHEN 4282)

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) Quality is a moving target, which requires through us a commitment which is
(a) sustainable development
(b) employee welfare
(c) sequence of events for improvement
(d) customers' satisfaction.

(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) Where X is a random variable, the expected value of X is its,
(a) mean (b) range (c) standard deviation
(d) RMS value.

(iv) The 6 σ 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) Process capability (C_p) value for an incapable process to satisfy customer's requirement is
(a) 1 (b) < 1 (c) > 1 (d)100.

(vi) Random variations are due to
(a) special cause (b)common cause
(c) internal factors (d) carelessness of the operators.

(vii) 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.

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

(ix) In standard normal distribution, the population mean μ located at 'z', a standard normal variate, has a value of
(a) 0 (b) 1 (c) 2 (d) 6.

(x) The principles of TQM implementation in a business activity sets the
(a) core values first and then techniques & tools
(b) core values depending on the techniques employed and tools available
(c) tools and techniques first and then the core values
(d) the priority on the skill for using the tools and techniques.

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) What are seven statistical process control tools for use in the quality control activities in industries and business processes? Briefly discuss about all that.

(b) 20 successive wafers (100 chips on each) are inspected. The numbers of defects found in wafers are:

Wafer No.	1	2	3	4	5	6	7	8	9	10
No. of defects	16	14	28	16	12	20	10	12	10	17
Wafer No.	11	12	13	14	15	16	17	18	19	20
No.of defects	19	17	14	16	15	13	14	16	31	20

Draw the suitable control chart and comment.

6 + 6 = 12

5. (a) Construct X bar and R charts from the following table. For n = 5, A_2 = 0.58, D_4 = 2.11, D_3 = 0. Comment on the state of control.

Sample No.	1	2	3	4	5	6	7	8	9
X bar	50.4	26.0	86.6	95.6	39.2	88.9	61.3	22.5	59.4
R	35	44	23	65	18	26	51	19	33

(b) The following data shows rejection pattern of a food product based on its odour for various subgroups produced in a single day. Assume that subgroup size is constant at 96. Determine revised average fraction rejected for that day on excluding those subgroups having 'p' above upper control limit for once.

Subgroup No.	1	2	3	4	5	6	7
Number rejected	4	3	12	2	6	3	2

6 + 6 = 12

Group – D

6. (a) How would you draw line of comparison of definition or perception of quality between the manufacturing sector and service sector?

(b) What are Sampling and Non-Sampling errors? How would you classify the sampling inspection on various modes of operations?

(c) Explain the implications of continuous improvement with the help of Deming's wheel in terms of PDCA cycle.

4 + 4 + 4 = 12

7. (a) Define Taguchi's loss function.

(b) Explain Bath-Tub curve in relation to failure rate over time of an industrial product, say computer monitor.

6 + 6 = 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) Kaizen; ii) SWOT Analysis.

(b) What does ISO 9000 standards stand for? What are the different Quality Standards known in the industries/ Service sectors?

(4 + 4) + 4 = 12