Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(CHE)/SEM-8/CHE-804E/2012

2012

TOTAL QUALITY MANAGEMENT

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

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

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) *c*-charts are based on which distribution ?

a) Binomial b) Poisson

c) Gaussian d) None of these.

ii) Which of the following is a variable chart ?

a) u b) np

c) R d) c.

iii) Assignable causes are the result of differences among

a) workers b) machines

c) raw materials d) all of these.

iv) 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) Kaizen means

a) change for better b) lower the better

c) higher the better d) change for anything.

vi) The success of a sampling plan depends on

a) sample randomness b) sample size

c) lot size d) none of these.

vii) When the process capability is more than the specified tolerance, then the rejections are

a) less b) high

c) very less d) nil.

viii) Cause and effect diagram is also known as

a) fish bone diagram b) process variability

c) process centering d) none of these.

ix) AOQL refers to

a) Average Output Quality Level

b) Average Outgoing Quality Level

c) Average Output Quantity Level

d) Average Outgoing Quantity Level.

x) The guidelines for developing quality manual are given in

a) ISO 10011 b) ISO 10012

c) ISO 10013 d) ISO 10014.

xi) In a double sampling plan the probability of taking the second sample depends upon

a) quality of incoming lot

b) probability of rejection from the first sample

c) probability of acceptance and probability of rejection from the second sample

d) probability of acceptance and probability of rejection from the first sample.

xii) The impact of quality circles on organization is –

a) reduction of defects and improvement of quality

b) improvement of productivity, as a result of reduction in wastage and improvement in the total performance and more satisfying environment

c) development of problem solving capabilities at the lower levels

d) all of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) What are the basic objectives of a control chart in any business or production process ? 3

   b) What are the different types of control charts normally used in statistical process control ? 2

3. a) Define and explain briefly the simple sampling plan for attributes. 2

   b) Narrate and illustrate the differences between TQM and 6σ, where σ stands for estimate of standard deviation of the population of data. 3

4. Define and explain Lot-Tolerance Proportion defectives (LTPD) and Acceptable Quality Level (AQL).

5. What is the meaning of the term 'Kaizen' in Total Quality Management ?

6. Using the method of random variables, deduce the upper control limit of control chart for proportion defectives.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Write down the different steps in calculating and plotting an X bar and R chart for variable data. 6

b) Calculate and draw a control chart for the following set of observations on the products fabricated each hourly from 8 AM to 5 PM in a workshop. From each hour of processing job, 5 samples at random are measured with regard to a statistic of the product and recorded for process control purpose.

Sub-group	1	2	3	4	5	6	7	8	9
X_1	15·3	14·4	15·3	15·0	15·3	14·9	15·6	14·0	14·0
X_2	14·9	15·5	15·1	14·8	16·4	15·3	16·4	15·8	15·2
X_3	15·0	14·8	15·3	16·0	17·2	14·9	15·3	16·4	13·6
X_4	15·2	15·6	18·5	15·6	15·5	16·5	15·3	16·4	15·0
X_5	16·4	14·9	14·9	15·4	15·5	15·1	15·0	15·3	15·0

Given the following tables for calculation of constants need for the control chart preparation

n	D_4	n	D_4	n	D_4
2	3·267	7	1·924	12	1·717
3	2·574	8	1·864	13	1·693
4	2·282	9	1·816	14	1·672
5	2·114	10	1·777	15	1·653
6	2·004	11	1·744		

n	A_2	n	A_2	n	A_2
2	1·880	7	0·419	12	0·266
3	1·023	8	0·373	13	0·249
4	0·729	9	0·337	14	0·235
5	0·577	10	0·308	15	0·223
6	0·483	11	0·285		

and $D_3 = 0$ for sample size ≤ 5.

Draw the control chart, plot the points on the chart and comment on the status of control of the process. 9

8. a) What are the merits and demerits of 'Complete Enumeration' and 'Sampling Inspection' of the quality characteristic of a population of products or services ? 7

   b) What are the Sampling and Non-Sampling errors ? 3

   c) How would you classify the sampling inspection on various modes of operations ? 5

9. a) What are the Quality Management principles adopted in the modern business process or functional process ? 10

   b) Explain the principles of Deming's wheel with the help of a diagram. 5

10. a) Draw a *p*-chart from the following results of inspection of a lot of machine parts where the % of scraps are calculated for all the days from 1st to 27th day of month on a go-no-go jig used for the inspection. 10

Date	1	2	3	4	5	6	7	8
% Scrap	18·1	20·0	17·1	15·2	21·3	16	14·9	18·3

9	10	11	12	13	14	15
18·9	16·2	18·8	17·5	19·2	20·1	21·5

b) Determine the single sampling plan for AOQL 2%, an estimated process average of 1% and a lot size of 200, 1000 and 5000 respectively. What % of the product will be subjected to sampling inspection with each lot size ?

5

11. Write short notes on any *three* of the following : 3 × 5

a) Sampling techniques

b) Process capability

c) Profit *vs* capability

d) Kaizen

e) Concept and meaning of JIT.

==========