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RN-8177

B. E. - II (Sem. - IV) (Chem.) Examination

May / June – 2010

Fundamentals of Quality Management
(Institute Elective - I)

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 2 (SEM. - 4) (CHEM.)

Name of the Subject :

☛ FUNDAMENTALS OF QUALITY MANAGEMENT

☛ Subject Code No. : 8 1 7 7 ☛ Section No. (1, 2,.....) : 1&2

Seat No. :

Student's Signature

(2) Answer all the questions.
(3) Use separate answer book for each section.
(4) Figure to the right indicate full marks.
(5) Charts and Tables are permitted.

SECTION – I

1 Answer the following : **20**

(1) What do you understand by quality and quality assurance.

(2) What is Strategic Quality Management ?

(3) Differentiate between $\overline{X}$ and R charts.

(4) Define the term specification limits and control limits.

(5) What are the conditions required for using the chain sampling plans ?

(6) What is average sample number curve for double sampling plans ?

(7) Explain Poisson's probability distribution.

(8) What is sequential sampling plan ?

(9) What are the various types of control charts ?

(10) What is Process Capability Ratio (PCR) ?

2 Answer any **three** : **15**

(1) What are the various dimensions of Quality ?

(2) Explain the five phases of SQM with the help of schematic diagram.

(3) List the Doming's 14 points for TQM and mention the seven deadly diseases propounded by Doming.

(4) Define AOQ and ATI. Derive their expression for single sampling plans by Attributes.

(5) What is an ideal OC curve ? Explain procedure's risks and consumer's risks.

3 Solve any **two** : **15**

(1) Test on shear strength of spot weld made by seven different machinery give following results.

Machine	**No. of test**	**Average shear strength kg. X**	**Standard Deviation σ**
1	119	274	29
2	110	364	42
3	126	319	23
4	126	359	26
5	126	334	26
6	115	313	23
7	125	375	31
Total	847	2538	210

By using method of large subgroup the X and σ chart to judge whether there is a clear evidence that different machines represent different cause systems. Use simple unweighted average to draw X chart and σ chart with UCL and LCL. Also find out process capability of this test.

(2) The lot size N is 2000 in certain AOQL inspection procedure. The desire AOQL of 2% can be obtained with any one of the three sampling plans there are :

(i) n = 65, c = 2

(ii) n = 41, c = 1 and

(iii) n = 18, c = 0

If large number of lots 0.3% defective are submitted for acceptance, what will be average number of units inspected per lot under each of these sampling plans ?

(3) In a manufacturing process the number of defectives found in inspection of 20 lots of 100 each of given below:

Lot No.	1	2	3	4	5	6	7	8	9	10	11	12
No. of Defective	5	4	3	5	4	6	9	15	11	6	7	6

13	14	15	16	17	18	19	20
3	5	4	2	8	7	6	4

(i) Determine the control limits of p chart and state whether the process is in control.

(ii) Determine the new value of mean fraction defective is same points are out of control. Compute the corresponding control limits and state whether the process is still in control or not.

(iii) Determine the sample size when a quality limit not worse than 9% is desirable and a 10% bad product will not be permitted more than three times in their ends.

Table B

Factors for Estimating σ' from $\bar{R}$ or $\bar{\sigma}$

Number of observations in sub-group n	*Factor for estimate from* R $d_2 = R/\sigma'$	*Factor for estimate from* σ $c_2 = \bar{\sigma}/\sigma'$
2	1.128	0.5642
3	1.693	0.7236
4	2.059	0.7979
5	2.326	0.8407
6	2.534	0.8686
7	2.704	0.8882
8	2.847	0.9027
9	2.970	0.9139
10	3.078	0.9227
11	3.173	0.9300
12	3.258	0.9359
13	3.326	0.9410
14	3.407	0.9453
15	3.472	0.9490
16	3.532	0.9523
17	3.588	0.9551
18	3.640	0.9576
19	3.689	0.9599
20	3.735	0.9619
21	3.778	0.9638
22	3.819	0.9655
23	3.858	0.9670
24	0.895	0.9684
25	3.931	0.9696
30	4.086	0.9748
35	4.213	0.9784
40	4.322	0.9811
45	4.415	0.9832
50	4.498	0.9849
55	4.573	0.9863
60	4.639	0.9874
65	4.699	0.9884
70	4.755	0.9892
75	4.806	0.9900
80	4.854	0.9906
85	4.898	0.9912
90	4.939	0.9916
95	4.978	0.9921
100	0.015	0.9925

Table C

Factors for Determining from $\bar{R}$ the 3-Sigma Control Limits for $\bar{X}$ and R Charts from $\bar{R}$

Number of observations in sub-group	*Factor for $\bar{X}$ chart*	*Factor for R chart*	
		Lower control limit	*Upper control limit*
n	A_2	D_3	D_4
2	1.88	0	3.27
3	1.02	0	2.57
4	0.73	0	2.28
5	0.58	0	2.11
6	0.48	0	2.00
7	0.42	0.08	1.92
8	0.37	0.14	1.86
9	0.34	0.18	1.82
10	0.31	0.22	1.78
11	0.29	0.22	1.74
12	0.27	0.28	1.72
13	0.25	0.31	1.69
14	0.24	0.33	1.67
15	0.22	0.35	1.65
16	0.21	0.36	1.64
17	0.20	0.38	1.62
18	0.19	0.39	1.61
19	0.19	0.40	1.60
20	0.18	0.41	1.59

Table G

Summation of Terms of Poisson's Exponential Binomial Limit 1,000 × probability of c or less occurrences of event that has average number of occurrences equal to c' or np'

$\frac{c}{c' \text{ or } np'}$	0	1	2	3	4	5	6	7	8	9
0.02	980	1,000								
0.04	961	999	1,000							
0.06	942	998	1,000							
0.08	923	997	1,000							
0.10	905	995	1,000							
0.15	861	990	999	1,000						
0.20	819	982	999	1,000						
0.25	779	974	998	1,000						
0.30	741	963	996	1,000						
0.35	705	951	994	1,000						
0.40	670	938	992	999	1,000					
0.45	638	925	989	999	1,000					
0.50	607	910	986	998	1,000					
0.55	577	894	982	998	1,000					
0.60	549	878	977	997	1,000					
0.65	522	861	972	996	999	1,000				
0.70	497	844	966	994	999	1,000				
0.75	472	827	959	993	999	1,000				
0.80	449	809	953	991	999	1,000				
0.85	427	791	945	989	998	1,000				
0.90	407	772	937	987	998	1,000				
0.95	387	754	929	984	997	1,000				
1.00	368	736	920	981	996	999	1,000			
1.1	333	699	900	974	995	999	1,000			
1.2	301	663	879	966	992	998	1,000			
1.3	273	627	857	957	989	998	1,000			
1.4	247	592	833	946	986	997	999	1,000		
1.5	223	558	809	934	981	996	999	1,000		
1.6	202	525	783	921	976	994	999	1,000		
1.7	183	493	757	907	970	992	998	1,000		
1.8	165	463	731	891	964	990	997	999	1,000	
1.9	150	434	704	875	956	987	997	999	1,000	
2.0	135	406	677	857	947	983	995	999	1,000	

SECTION – II

4 Answer the following questions : **20**

(1) List different quality system standards.

(2) What are various categories of Rajiv Gandhi National Quality Award.

(3) Enumerate four major benefits of ISO 9000 certification.

(4) What is ISO 14001 ?

(5) What do you mean by 'Service Quality' ?

(6) How 'voice of customers' is obtained in QFD ?

(7) Write steps of DMAIC process.

(8) What do you mean by 'Six sigma' quality level ?

(9) In a process there are 7 defects per 2,50,000 units. Find defects per Million opportunities.

(10) Write four applications of QFD.

5 Attempt any **four** : **16**

(1) Explain Benchmarking Triangle.

(2) Explain the process of Benchmarking.

(3) What is Poka-Yoke ? Explain.

(4) Explain Six Sigma Training Hierarchies.

(5) Explain two golden rules for objective evidence in ISO 9000 audits.

(6) Compare 'products' and 'services'.

6 Answer any two : **14**

(a) Explain Tata Business Excellence Model.

(b) Explain QFD - House of Quality Analysis Procedure.

(c) Explain quality related priorities of Indian Companies.
