Roll No. ☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 03

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B.Tech. (Ind. Engg. & Mgt.) (Spl. in TQM) PT (Sem.–4)
STATISTICAL QUALITY CONTROL
Subject Code : IEM-403
M.Code : 61018

Time : 3 Hrs.   Max. Marks : 40

INSTRUCTIONS TO CANDIDATES :
1. **Attempt EIGHT out of TEN questions from SECTION-A carrying TWO marks each.**
2. **Attempt any FOUR out of SIX questions from SECTION-B carrying SIX marks each.**

SECTION-A

1. **Answer briefly :**

    a. Write importance of planning phase for quality control.

    b. Discuss various objectives of inspection.

    c. Write disadvantages of sampling.

    d. What do you mean by sampling for variables?

    e. What do you mean by acceptance control?

    f. Write short note on operating characteristics curve.

    g. What is Taguchi quadratic loss function? Discuss.

    h. Write various stages in process capability studies.

    i. Write objectives of statistical process control.

    j. Discuss limitations of control charts.

SECTION-B

2. The quality control inspector at Cocoa Fizz would like to develop a range (R) chart in order to monitor volume dispersion in the bottling process. Use the data from Table 1 to develop control limits for the sample range.

3. Compute the *Cpk* measure of process capability for the following machine and interpret the findings. What value would you have obtained with the *Cp* measure?

Machine Data: USL = 80

LSL = 50

Process σ = 5

Process μ = 60

Sample No.	Bottle volume in Ounces				Average $\overline{X}$	Range R
	1	2	3	4		
1	15.85	16.02	15.83	15.93	15.91	.19
2	16.12	16.00	15.85	16.01	15.99	.27
3	16.00	15.91	15.94	15.83	15.92	.17
4	16.20	15.85	15.74	15.93	15.93	.46
5	15.74	15.86	16.21	16.10	15.98	.47
6	15.94	16.01	16.14	16.03	16.03	.20
7	15.75	16.21	16.01	15.86	15.86	.46
8	15.82	15.94	16.02	15.94	15.93	.20
9	16.04	15.98	15.83	15.98	15.86	.21
10	15.64	15.86	15.94	15.89	15.83	.30
11	16.11	16.00	16.01	15.82	15.99	.29
12	15.72	15.85	16.12	16.15	15.96	.43
13	15.85	15.76	15.74	15.98	15.83	.24
14	15.73	15.84	15.96	16.10	15.91	.37
15	16.20	16.01	16.10	15.89	16.05	.31
16	16.12	16.08	15.83	15.94	15.99	.29
17	16.01	15.93	15.81	15.68	15.86	.33
18	15.78	16.04	16.11	16.12	16.01	.34
19	15.84	15.92	16.05	16.12	15.98	.28
20	15.92	16.09	16.12	15.93	16.02	.20
21	16.11	16.02	16.00	15.88	16.00	.23
22	15.98	15.82	15.89	15.89	15.90	.16
23	16.05	15.73	15.73	15.93	15.86	.32
24	16.01	16.01	15.89	15.86	15.94	.15
25	16.08	15.78	15.92	15.98	15.94	.30
Total					**398.75**	**7.17**

4. Control charts of $\overline{X}$ and R. σ are to be maintained on drawings from a bowl of chips the distribution of which is approximately normal. The subgroup size is 5, $\overline{X}$ is 60 and σ is 8. Assume that 3 sigma control limits are to be based on $\overline{X}$ and σ. Compute the value of the upper control limit the centre line and the lower control limit for the $\overline{X}$, R and σ charts respectively.

5. The lot size N is 2,000 in a certain AOQL inspection procedure. The desired AOQL of 2% can be obtained with any one of the three sampling plans. These are :

   a. n = 65, c = 2

   b. n = 41. c = 1 and

   c. n = 18, c = 0.

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

6. Write short notes on the following :

   a. Systematic sampling plan

   b. Producer's risk and consumer's risk

7. a. State the objectives of $\overline{X}$ and R charts.

   b. Compare $\overline{X}$ chart with R charts. Discuss the circumstances in which either of the two or a combination of these will be used for the purpose of control.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.