LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **STATISTICS**

THIRD SEMESTER – **NOVEMBER 2019**

18PST3MC03 – STATISTICAL QUALITY CONTROL

Date: 02-11-2019 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

SECTION - A

Answer ALL the questions. (10X 2 = 20)

1. What are the major statistical methods for quality improvement?
2. Distinguish between warning limits and action limits.
3. Explain multivariate quality control.
4. State the advantages of cusum chart.
5. Define product characterization.
6. What is the difference between Cpk and Cpm?
7. Mention any two uses of OC curve for control charts.
8. Define AOQL.
9. Expand DMAIC.
10. What is six sigma?

SECTION- B

Answer any FIVE questions. (5X 8 = 40)

11. Describe the procedure of obtaining the OC curve for $\bar{X}$chart.
12. State the reasons for popularity of control charts.
13. The number of workmanship nonconformities observed in the final inspection of disk-drive assemblies have been tabulated as shown below: Does the process appear to be in control?

Day	1	2	3	4	5	6	7	8	9	10
No.of Nonconformities	10	30	18	10	20	24	15	26	21	8

14. Explain the graphical representation of cusum chart.
15. When do we use control chart based on coefficient of variation and obtain the control limits with an example.
16. Write the major uses of data obtained from a process capability analysis.
17. Describe the procedure for CSP-1 plans
18. Explain the eight dimensions of quality.

SECTION - C

Answer any TWO Questions. (2 X 20 = 40)

19. i) Briefly explain Deming 14 points. (10)

ii) A control chat for the number of nonconforming piston rings is maintained on a forging process with np=16. A sample of size 100 is taken each day and analyzed.

a) Find the control limits for the fraction nonconforming.

b) What is the probability that a shift in the process average to np =20 will be detected on the first day following the shift(use normal approximation)?

c) What is the probability that the shift will be detected by at least end of the third day?

d) Find the smallest sample size that will give a positive lower control limit. (10)

20. i) Obtain the control limits for EWMA chart. (10)

ii) Set up a moving average control chart using $\mu=10, \sigma=1$ and w=5 and draw conclusion for the following data (10)

i	1	2	3	4	5	6	7	8	9	10
x_i	9.45	7.99	9.29	11.66	12.16	10.18	8.08	11.46	9.2	10.34

21. i) Explain the uses of C_p, C_{pk} and C_{pm} with example.

ii) Draw the OC curve for a single sampling plan n=89 and c=2. Also obtain the expressions for AOQ and ATI after rectification. (10)

22. Explain the DMAIC procedure in detail.

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