LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – NOVEMBER 2017

16PST3MC03/ST3817 - STATISTICAL QUALITY CONTROL

Date: 04-11-2017 Dept. No. Max. : 100 Marks
Time: 09:00-12:00

Section – A

Answer all the questions. **(10 x 2 = 20)**

1. Distinguish between non-conforming unit and non-conformity.
2. Define quality improvement.
3. What are assignable and chance causes of variations?
4. What do you understand by warning limits?
5. When do we use p chart?
6. Write the control limits for u chart.
7. Define poor process capability and excess process capability.
8. Why do we prefer to use ewma chart than shewart control chart?
9. Write the phase1 control limits for T^2 control chart.
10. Define AQL and LTPD.

Section – B

Answer any five questions. **(5 x 8 = 40)**

11. Explain the eight dimensions of quality.
12. Describe the following terms with illustration
    a) Adaptive Sampling Interval
    b) Off line and online quality control
    c) Defect and defectives
    d) Non – random pattern
13. What are the various patterns in the control chart?
14. Derive the control limits for and charts.
15. Describe the procedure of obtaining the OC curve for a p-chart with an example.
16. Explain moving average control chart with illustration.
17. Explain the double sampling plan and obtain the expression for AOQ and ATI.
18. Explain the multivariate control charts by using Hotelling T^2 and chi-square.

Section – C

Answer any two questions. **(2 x 20 = 40)**

19. State and explain Deming's fourteen points in detail.

20. a) A process in cotrolled with a fraction non conforming control chart with three sigma control limits, n =100, UCL = 0.161, center line = 0.080, and LCL = 0.

    i. Find the equivalent control chart for the number non conforming.

    ii. Use the Poisson approximation to the binomial to find the probability of type I error.

    iii. Use the correct approximation to find the probability of a type II error if the process non conforming shifts to 0.2.

    iv. What is the probability of detecting the shift in part (iii) by at most the fourth sample after the shift?

    b) Explain the uses of C_p and C_{pk} and C_{pm} with illustration. (12 + 8)

21. a) Derive the control limits for EWMA control charts

    b) Set up an EWMA control chart for the process mean with the target value $\mu_0 = 17$, $\sigma = 1$, $\lambda = 0.2$ and L = 3 to the data given below and interpret the result

i	1	2	3	4	5	6	7	8	9	10
	18	16	17	19	18	15	16	17	19	13

(8 + 12)

22. Explain the DMAIC procedure in detail.

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