LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

SIXTH SEMESTER – **APRIL 2024**

UST 6503 – STATISTICAL QUALITY CONTROL

Date: 12-04-2024   Dept. No.   Max. : 100 Marks
Time: 01:00 PM - 04:00 PM

SECTION A – K1 (CO1)		
	Answer ALL the questions	**(10 x 1 = 10)**
1	**Define the following**	
a)	Quality	
b)	Histogram	
c)	Statistical Process control	
d)	Process Capability	
e)	Producer's risk	
2	**True or False**	
a)	Statistical quality control techniques are based on the theory of probability.	
b)	The shape of the box plot does not show the scatter of the data.	
c)	Statistical process control involves monitoring and controlling a process to prevent poor quality.	
d)	CUSUM chart is better suited when small shifts are considered.	
e)	The purpose of acceptance sampling is to estimate lot quality.	
SECTION A – K2 (CO1)		
	Answer ALL the questions	**(10 x 1 = 10)**
3	**Fill in the blanks**	
a)	Quality characteristics are classified into variables and _____.	
b)	A histogram is a graphical representation of the frequency distribution of _____ data.	
c)	S chart is used to monitor _____ of a quality characteristic.	
d)	_____ chart are more effective for the chemical and process industries.	
e)	Sequential sampling plan is an extension of ._____	
4	**MCQ**	

a)	Performance of a product is
	    a. How long the product last
	    b. How easy it is to repair the product
	    c. How often the product fails
	    d. Whether the product is capable of doing the intended job	

b)	Stem and leaf plot are primarily used to analyze the spread and the distribution of
	    a. Continuous data
	    b. Categorical data
	    c. Ratio type data
	    d. None of the above	

c)	Quantities that can be numerically measured can be plotted on a _____
	    a. $\overline{X}$ chart
	    b. p chart
	    c. c chart
	    d. np chart	

d)	CUSUM chart was first presented by
	    a. Shewhart
	    b. Page
	    c. Kotz
	    d. Luceno	

e)	Lot Tolerance percent defective is also known as
	    a. Rejectable quality level
	    b. Acceptable quality level
	    c. Indifferent quality level
	    d. None of the above

SECTION B – K3 (CO2)

Answer any TWO of the following (2 x 10 = 20)

5	Explain the eight dimension of quality according to Garvin.
6	Construct histogram and stem and leaf plot for the data given below

48	41	35	36	37	26	36	46	35	47
35	34	36	42	43	36	56	32	46	30
37	43	17	26	28	27	45	33	22	27
16	22	33	30	24	23	22	30	31	17

7	Explain the procedure to construct np chart.
8	Write a note on process capability ratio with a suitable example

SECTION C – K4 (CO3)

Answer any TWO of the following (2 x 10 = 20)

9	List the advantages of total quality management
10	The following data relates to the defectives in 22 lots each containing 2000 rubber belts

425	430	216	341	225	322	280	306	337	305	356
402	216	264	126	409	193	326	280	389	451	420

Draw a suitable control chart and state your conclusions.

11	Describe the procedure of constructing c-chart with an example.
12	Distinguish between producer's risk and consumer's risk.

SECTION D – K5 (CO4)

Answer any ONE of the following (1 x 20 = 20)

13	A quality control inspector has taken ten samples of size four packets each from a potato chips company. The contents of the sample are given below, Calculate the control limits for mean and range chart.

Sample Number		1	2	3	4	5	6	7	8	9	10
Observations	1	12.5	12.8	12.1	12.2	12.4	12.3	12.6	12.4	12.6	12.1
	2	12.3	12.4	12.6	12.6	12.5	12.4	12.7	12.3	12.5	12.7
	3	12.6	12.4	12.5	12.5	12.5	12.6	12.5	12.6	12.3	12.5
	4	12.7	12.8	12.4	12.3	12.5	12.6	12.8	12.5	12.6	12.8

(Given n=4 A_2=0.729 D_3= 0 D_4=2.282)

14	(i) Explain the benefits of statistical quality control. (ii) Explain the construction of CUSUM chart.

SECTION E– K6 (CO5)

Answer any ONE of the following (1 x 20 = 20)

15	(i) Elaborate the procedure of constructing qq plot with suitable example. (ii) Distinguish between Shewhart control chart and CUSUM control chart.
16	Discuss about (i) AQL (ii) LTPD (iii) AOQL (iv) ATI in the case of single sampling plan.

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