Unit VII

Statistical Quality Control

Section - A

One mark questions:

1. Define Statistical Quality Control. (U)
2. Mention a type of cause for variation in a manufacturing process. (K)
3. What are chance causes? (K)
4. What are assignable causes? (K)
5. Which type of cause of variation is detected by SQC? (K)
6. Which cause of variation cannot be detected by SQC? (K)
7. Mention an advantage of SQC. (K)
8. What do you mean by process control? (K)
9. What do you mean by product control? (K)
10. What is a defect in SQC? (K)
11. Give an example for defect. (U)
12. What are defectives in SQC? (K)
13. Give an example for defectives. (U)
14. What is a control chart? (K)

15. What is upper control limit? (K)
16. What is lower control limit? (K)
17. Mention different types of control charts. (K)
18. Name control charts for variables. (K)
19. Name control charts for attributes. (K)
20. Name the control chart used for number of defectives. (K)
21. Name the control chart used for number of defects per unit. (K)
22. In $\bar{X}$ - chart if one of the sample mean lies outside the control limits, what would you conclude? (S)
23. In a control chart if one point lies outside the control lines, what is your inference? (S)
24. Define acceptance sampling. (U)
25. Write an advantage of acceptance sampling. (K)
26. Write a disadvantage of acceptance sampling. (K)

Section - B

Two mark questions:

27. Mention two types of causes for variation in a manufacturing process. (K)
28. What are chance and assignable causes? (K)
29. Mention two advantages of SQC. (K)
30. What do you mean by product control and process control? (K)
31. In SQC define variable and attribute. (U)
32. In SQC what is a defect? Give an example. (U)
33. In SQC what are defectives? Give an example. (U)
34. In SQC what are defect and defectives? (K)
35. Give one example each for defect and defectives. (U)
36. Name the control charts for variables and attribute. (K)
37. Write the upper and lower control limits for $\bar{X}$ - chart, when standards are known. (U)
38. Compute upper control limit for $\bar{X}$ - chart when $\bar{X}^{|} = 40$, $\sigma^{1} = 6$ and A = 1.342. (A)
39. Write the upper and lower control limits for $\bar{X}$ - chart, when standards are not known. (U)
40. If $\bar{\bar{X}} = 40$, $\bar{R} = 2.5$ and $A_2 = 0.577$, find lower control limit of $\bar{X}$ - chart. (U)
41. Write the upper and lower control limits for R-chart when standards are known. (U)
42. If $\sigma^{1} = 4$ and n = 5, find average quality level [C.L.] of R-chart. (U)
43. Write the upper and lower control limits for R-chart when standards are not known. (U)
44. If $\bar{R} = 2.5$ and n = 4, find upper control limit of R-chart. (U)
45. Write the upper and lower control limits for d-chart when standards are known. (U)
46. If $P^{|} = 0.1$ and n = 100, calculate U.C.L. for d-chart. (A)
47. Write the upper and lower control limits for d-chart when standards are not known. (U)
48. Write the upper and lower control limits for c-chart when standards are known. (U)
49. Write the upper and lower control limits for c-chart when standards are not known. (U)
50. In a floor mat manufacturing company, the average number of defects per square meter of floor mat is known to be 4. Find the upper control limit for the number of defects. (U)

51. If $\bar{c}$ = 2, find U.C.L. for c - chart. (U)
52. Write two advantages of acceptance sampling. (K)
53. Write relative merits and demerits of single sampling plan and double sampling plan. (K)

Section - C

Five mark questions:

54. A drilling machine is set to dig holes with a mean diameter of 15mm and a standard deviation of 0.2mm. Find the control limits for mean, for samples of size 5 each. (U)
55. If $\bar{\bar{X}}^{|}$ = 4.5, σ^{1} = 1.5 for samples of size n = 4, compute control limits of $\bar{X}$ - chart. (A)
56. If $\bar{\bar{X}}$ = 40, $\bar{R}$ =2.5 for samples of size n = 5, compute control limits of $\bar{X}$ - chart. (A)
57. The measurement of 8 sub groups of samples of size 4 each gave the following results: $\bar{\bar{X}}$ = 33.3 and $\bar{R}$ = 8.2. Write down the control limits for $\bar{X}$ -chart. (U)
58. For the following data, find control limits of $\bar{X}$ -chart. (Given, A_2 = 0.729) (U)

Sub-group	1	2	3	4	5	6	7	8	Total
Mean	52	48	53	49	50	48	53	47	400
Range	10	11	8	12	9	10	9	11	80

59. For the following data, find control limits of $\bar{X}$ -chart. (Given, A_2 = 0.729) (U)

Sub-group	1	2	3	4	5	6
Mean	52	49	53	48	51	47
Range	4	6	5	7	3	5

60. For the following data, find control limits of $\bar{X}$ -chart. (Given, A_2 = 0.577) (U)

Sub-group	1	2	3	4	5	6
Mean	49	52	53	51	47	48
Range	3	5	7	6	4	5

61. Given, n = 4 and R_i: 14, 8, 11, 9, 6 and 12. Find the control limits of R-chart. (U)
62. Given, n = 5 and R_i: 6, 3, 8, 4, 1, 2, 5 and 7. Find the control limits of R-chart. (U)
63. If $P^{|}$ = 0.02 and n = 100, calculate the control limits of np -chart. (A)
64. In a fish net manufacturing process, the proportion defectives $p^{|}$ = 0.01. If the process is based on samples of size 100 each, find the control limits of np-chart. (U)
65. Calculate the control limits for d-chart given $\bar{p}$ = 0.05 and sample size 50. (A)
66. In a mobile phone manufacturing plant, a production manager has inspected a sample of 25 phone sets at regular intervals. If the average fraction defective is $\bar{p}$ =0.02, write down the control limits for number of defectives. (U)
67. Ten samples of 100 P.V.C. pipes manufactured by a firm are inspected for the number of defectives. The number of defective pipes is noted as: 2, 1, 3, 0, 2, 2, 4, 4, 5, 6. Calculate the control limits for np-chart. (A)
68. A company manufactures flooring tiles. Samples of 100 tiles each are drawn at regular intervals. The number of defective tiles is given below.

Sample no.	1	2	3	4	5	6	7	8	9	10
No. of defective tiles	2	3	1	0	4	2	4	2	6	4

Obtain the control limits for the above data. (S)

69. In a floor mat manufacturing company, the average number of defects per square meter is known to be 4. Determine the control limits for the number of defects. (A)
70. In a printing industry at regular intervals, cloth is inspected for defects in printing. If on an average 0.5 defects are expected per square meter, obtain suitable control limits. (A)
71. One meter of cloth was inspected for weaving defects. Total number of defects for 10 such samples was 24. Find the control limits for defects. (U)
72. During an examination of equal length of cloth, the following are the number of defects observed as: 4, 5, 6, 6, 3, 2, 6, 7, 3, 4. Calculate control limits for suitable control chart. (S)
73. Twenty pieces of cloth out of different rolls contained respectively 1, 4, 3, 2, 5, 4, 6, 7, 2, 3, 2, 5, 7, 6, 4, 5, 1, 2, 3, 8 imperfections. Find control limits for c - chart. (U)
74. For the following data construct R- chart and draw your inference.
(Given, $D_3 = 0$, $D_4 = 2.115$ and $\overline{R} = 4$) (S)

Sub-group	1	2	3	4	5	6	7	8
Range	4	5	5	3	6	2	4	3

OR

(For visually challenged students only)

Explain single sampling plan.

75. In a textile mill, cloth is inspected at regular intervals for weaving defects. The results are recorded as below.

Sample number	1	2	3	4	5	6	7	8
Defects/sq. metre	2	1	0	0	2	5	1	1

If on an average 1 defect is expected per square meter, draw c-chart and hence write your conclusion. (S)

OR

(For visually challenged students only)

Explain double sampling plan.