

Sl. No. of Question Paper: 1455

Unique paper code : 2511306

Name of the paper : Quality Control Techniques

Name of the course : B. Tech. Instrumentation (erstwhile FYVP) ^{F-7}

Semester : III

Time: 3 hours

Max. Marks: 75

Attempt five questions in all. Question No. 1 is compulsory. Use of non-programmable scientific calculators and statistical tables is permitted.

- Q1.(a) Differentiate between: (3)
- (i) AQL & IQL
 - (ii) Stratified sampling & cluster sampling
- (b) Explain the six sigma technique of quality improvement. (3)
- (c) Control charts for \bar{x} and R are kept on the manufacturing process of a drive shaft. After 30 subgroups have been drawn and inspected, and the diameters recorded, $\sum \bar{x} = 624.30 \text{ mm}$ and $\sum R = 123 \text{ mm}$. The subgroup size is 4. Assume that the diameters are normally distributed. Assuming that the process is in a state of control, compute the central lines and control limits for the \bar{x} chart and R chart. (3)
- (d) What is the need of ISO 14000? (3)
- (e) What is LTPD? How it is significant in quality control. (3)
- Q2.(a) Explain the Deming's approach of quality improvement. (5)
- (b) What is a cause-effect diagram? Draw a cause-effect diagram for problems in an educational organization. (5)
- (c) Discuss the legal aspects of quality. (5)
- Q3.(a) The data shown in the table are \bar{x} and R values for 24 samples of size $n=5$ taken from a process producing bearings. The measurements are made on the inside diameter of the bearing. Set up \bar{x} and R charts on this process. Does the process seem to be in statistical control? If necessary, revise the trial control limits. (7)

P.T.O

Sample No.	Mean	Range	Sample No.	Mean	Range
1	34.5	3	13	35.4	8
2	34.2	4	14	34.0	6
3	31.6	4	15	37.1	5
4	31.5	4	16	34.9	7
5	35.0	5	17	33.5	4
6	34.1	6	18	31.7	3
7	32.6	4	19	34.0	8
8	33.8	3	20	35.1	4
9	34.8	7	21	33.7	2
10	33.6	8	22	32.8	1
11	31.9	3	23	33.5	3
12	38.6	9	24	34.2	2

(10)

If the specification limits are 33 ± 6 , what can u say about the process capability.

(b) Explain the concept of rational subgroups while sampling. (5)

Q4.(a) Double Sampling plan is more advantageous than a single sampling plan. Justify. (5)

(b) Design a single sampling plan, which will meet the following requirements: (10)

$$p_1 = 0.01 , p_2 = 0.10$$

$$\alpha = 0.05 , \beta = 0.10$$

P.T.O

- Q5.(a) Surface defects have been counted on 25 rectangular steel plates. Set up a control chart for nonconformities using the following data. Does the process appear to be in statistical control?

Plate Number	Number of Non-conformities	Plate Number	Number of Non-conformities
1	1	14	0
2	0	15	2
3	4	16	1
4	3	17	3
5	1	18	5
6	2	19	4
7	5	20	6
8	0	21	3
9	2	22	1
10	1	23	0
11	1	24	2
12	0	25	4
13	8		

(10)

- (b) Discuss the relationship between control charts and statistical hypothesis testing (5)

- Q6.(a) Suppose that a single sampling plan with $n = 50$ and $c = 2$ is being employed for receiving inspection where the vendor ships the product in lots of size 5000. Draw the OC curve for the plan. Also, draw the AOQ curve and find AOQL. (10)

- (b) Differentiate between: (5)
- (i) Quality Control and Quality Assurance
 - (ii) Natural Limit and Specification Limit

- Q7.(a) Discuss the different clauses of ISO 9000:2001? (10)

- (b) What are advantages of implementing ISO in food industry? (5)