

Set-1

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 and any five from the rest

The figures in the right-hand margin indicate marks

Draw neat sketch wherever necessary
Use of Normal and Poisson distribution
tables is permitted.

1. Briefly answer *all* the following : 2 × 10
- (a) Define re-engineering.
 - (b) What is appraisal cost in quality control ?
 - (c) What is JIT ?
 - (d) What is poka-yoke ?
 - (e) What is kaizen ?
 - (f) Define PCR.
 - (g) Distinguish between defect and defective.
 - (h) Define Type-I error in a control chart.

- (i) Define ATI.
 - (j) Sketch an AOQ curve for a single sampling plan.
2. (a) Define quality system and explain the evolution of ISO 9000. 5
- (b) What should be the behaviour of a good quality auditor? 5
3. (a) Define quality circle and explain the role of its steering committee. 5
- (b) Explain Taguchi's quality loss function and how it is different from earlier philosophy. 5
4. Samples each of size 4 bolts are taken from an automatic lathe every hour. For each bolt in a sample, the major diameter is measured as X . For each sample the average \bar{X} and range R are computed and plotted on respective control charts. After 30 samples, $\Sigma \bar{X} = 720$ and $\Sigma R = 12$. Specification limits for bolt diameter are 25.0 ± 0.5 . For sample size of 4, take $c_2 = 0.79798$,

$$d_2 = 2.059 \text{ and } A_2 = 0.729.$$

- (i) What should be the control limits for \bar{X} chart so as to have an α - error of 0.3 % ?
- (ii) If all the points plotted on \bar{X} chart are within the two control limits, will any bolt be rejected if process mean is shifted to 25.5 ? If yes, What is the percentage rejection ? 10
5. In a foundry shop, castings are inspected for nonconformities in each shift. The following table gives number of nonconformities 'c' and number of castings 'n' inspected in each shift for 2 days. The mean value of nonconformities per unit has been known to be 2.0 from past experience. Plot a suitable control chart on a graph paper to monitor if the process is under control. Give your comment on the status of the process. 10

Shift	Day1		Day2	
	n	c	n	c
1st	6	10	6	14
2nd	5	12	5	20
3rd	3	6	3	8

6. What will be the probability of acceptance for a lot containing 1% nonconforming items using the following double sampling plan ?

Sample size	Acceptance Number	Rejection Number
20	0	3
20	0	4

Explain its working procedure with the help of a flow chart. 10

7. (a) What do you mean by six sigma level of quality? 5
- (b) Differentiate between military standard and Dodge-Romig sampling plans. 5
8. Write short notes on any two of the following : 10
- (i) Benchmarking
- (ii) TQM
- (iii) QFD