

[This question paper contains 4 printed pages.]

3091

Your Roll No. ....

MEM

J

Paper – ME.654

(ADVANCED QUALITY CONTROL)

Time: 3 Hours

Maximum Marks: 100

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*Attempt any five questions.*

*Use of standards and Statistical Tables allowed.*

1. (i) What is process capability? (5)
- (ii) A shaft is to fit in a round hole having dimensions specified as 50 H8/d6.
  - (a) Determine upper and lower specifications limits of hole. If the material is CI suggest the process to achieve required accuracy.
  - (b) The shaft is of medium carbon steel. Make a process sequence along with control limits of the processes through which it passes. (15)

P.T.O.

2. Explain salient features of ISO:9004. (20)
3. Explain,
- (a) Analysis of variance
  - (b) Correlation and regression analysis
  - (c) Significance test
  - (d) Three term AOQL (5×4)
4. (i) A piece of ground support equipment for a missile has a specified mean time between failures of 100 hours. What is the reliability for a mission time of 10 hours? 100 hours? 300 hours. Plot mission time us reliability, assuming an exponential distribution. (10)
- (ii) Determine the sequential sampling plan for the following
- $$\alpha = 0.05 \quad P_1 = 0.10$$
- $$\beta = 0.20 \quad P_2 = 0.30 \quad (10)$$
5. (i) It is desired to have a reliability of at least 0.99 for a specified service period of 8000 hours on the assumption of a uniform failure rate. What is the least value of mean life ( $\theta$ ) that will yield this desired reliability. (10)

- (ii) Control charts for  $\bar{X}$  & R are maintained on a dimension. Subgroup size is 4. After 20 subgroups

$$\sum \bar{X} = 826.5 \quad \sum R = 5.65$$

Find centre line and control limits.

$$d_2 = 2.059, D_4 = 2.28, D_3 = 0. \quad (10)$$

6. (i)

S. No.	No. of Tests	AV Tensile strength N/mm <sup>2</sup>	Standard Deviation
1	55	42	1.14
2	60	40.7	1.1
3	70	41.2	0.85
4	50	40.6	1.49

Plot  $\bar{X}$  &  $\sigma$  charts from the data above obtained from 4 mills. (10)

- (ii) Use table G to find QC curve of the single sampling plan  $n = 200$ ,  $C = 4$ .  $N$  is large.

(10)

7. (i) Explain consumer's risk and producers risk.

(5)

- (ii) In an acceptance sampling under reduced inspection in the ABC standard, double sampling is used with code letter J and an AQL of 25%.

P.T.O.

A 5% defective lot is submitted, use table G to determine approximate probabilities.

- (a) Lot accepted & reduced inspection continues
  - (b) Lot accepted & normal inspection starts
  - (c) Lot rejected (15)
8. (a) A set of  $n$  coins is tossed  $N$  times. Suggest a procedure to test the hypothesis that the coins are unbiased. (10)
- (b) What is quality function deployment? (5)
  - (c) Cost of quality. (5)