

Seat No. : _____

AE-119
April-2016
M.Sc., Sem.-IV
509 : Statistics
(Industrial Statistics)

Time : 3 Hours]

[Max. Marks : 70

- Instructions :** (1) Attempt **all** questions.
(2) **All** questions carry equal marks.

1. (a) What do you understand by statistical quality control ? Discuss briefly its need and utility in industry.

OR

- (a) What do you understand by quality ? Discuss various components or dimensions of quality.
(b) Explain :
(i) Appraisal costs
(ii) External failure costs.

OR

- (b) Explain natural tolerance limits and specification limits.

2. (a) Explain the tabular cusum for monitoring the process mean.

OR

- (a) Explain the moving average control chart and compare it with other control charts.
(b) Discuss Johnson's method for designing the V-mask. Also discuss disadvantages of V-mask procedure.

OR

- (b) Discuss process capability ratio for an off-center process.

- (iii) Assignable variations may be due to
- (a) variations in raw materials
 - (b) limitations of the process
 - (c) limitations in the skills of the operator
 - (d) all of the above.
- (iv) The theory behind control charts stipulates that if a point on the control chart falls outside the plus or minus 3 standard deviations control limits, we are 99.7% sure that the process has changed.
- (a) True
 - (b) False
- (v) The _____ is the statistical foundation of control charts for variables.
- (a) Poisson distribution
 - (b) Binomial distribution
 - (c) Central limit theorem
 - (d) none of the above
- (vi) What do you understand by rational subgroups ?
- (vii) In tabular cusum H is = _____.
- (viii) EWMA control chart is less effective in detecting small shifts.
- (a) True
 - (b) False
- (ix) PCR = _____
- (x) PCR_{km} is given by
- (a) $\frac{LSL - USL}{6}$
 - (b) $\frac{USL - LSL}{\tau}$
 - (c) $\frac{USL - LSL}{6\tau}$
 - (d) none of the above.
- (xi) PCR_k measures actual capability in the process.
- (a) True
 - (b) False

(xii) A $\frac{1}{8}$ fraction is called a 2^{k-3} fractional factorial design.

(a) True

(b) False

(xiii) Skip-lot sampling plans should be used only when the quality of the submitted product is good as demonstrated by the vendor's quality history.

(a) True

(b) False

(xiv) Chain sampling plans make use of the cumulative results of several preceding lots

(a) True

(b) False
