Seat No. : _____

AI-105

April-2015

M.Sc., Sem.-IV

Paper-STA-509 : Industrial Statistics

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) Attempt **all** questions.

(2) **All** questions carry equal marks.

1. (a) Explain :
   (i) Prevention costs
   (ii) Appraisal costs

   OR

   Discuss SQC as an aid for Management Quality Planning.

   (b) Explain :
   (i) External Failure Costs
   (ii) Internal Failure Costs

   OR

   Explain the concept of six-sigma.

2. (a) Explain the cumulative sum control chart for monitoring process variability.

   OR

   Discuss Johnson's method for designing the V-mask.

   (b) Explain the standardized cusum.

   OR

   Explain the exponentially weighted moving-average control chart.

3. (a) What do you understand by process capability analysis ? How it is helpful in quality improvement program ?

   OR

   Discuss confidence intervals on process capability ratios.

   (b) Explain SkSP-1 and SkSP-2 plans.

   OR

   What do you understand by chain sampling ? Explain chain sampling plans.

4. (a) Explain how statistical process control methods and experimental design are interrelated for the improvement and optimization of process.

OR

Explain advantages of continuous sampling plans.

(b) Explain Taguchi's philosophy.

OR

Explain how 2^2 factorial design is useful in process development and improvement.

5. Answer the following :

(1) Statistical process control is a powerful collection of problem-solving tools useful in achieving process stability and improving capability through the reduction of variability. ((a) True (b) False)

(2) Quality is inversely proportional to variability. ((a) True (b) False)

(3) The cusum chart directly incorporates all the information in the sequence of sample values by plotting the cumulative sums of the deviations of the sample values from a target value. ((a) True (b) False)

(4) In tabular cusum K is = _____

(5) In tabular cusum H is = _____

(6) What do you understand by rational subgroups ?

(7) The moving –average control chart is less effective than the Shewhart chart in detecting small process shifts. ((a) True (b) False)

(8) The EWMA is used extensively in time series modeling and in forecasting. ((a) True (b) False)

(9) PCR measures potential capability in the process. ((a) True (b) False)

(10) PCR_K =

(a) min (PCR_U, PCR_L) (b) max (PCR_U, PCR_L) (c) (PCR_U/PCR_L) (d) none of the above

(11) A $\frac{1}{4}$ fraction is called a 2^{k-2} fractional factorial design. ((a) True (b) False)

(12) Continuous – sampling plans are rectifying inspection plans, in that the quality of the product is improved by the partial screening. ((a) True (b) False)

(13) Chain sampling plans make use of the cumulative results of several preceding lots. ((a) True (b) False)

(14) When there are several factors of interest in an experiment, a _____ design should be used.
