SLR-DK-232

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination Oct/Nov-2019
Statistics (Special Paper - XVI)
QUALITY MANAGEMENT AND RELIABILITY

Day & Date: Friday, 11-10-2019 Max. Marks: 70
Time: 08:00 AM To 10:30 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat diagrams must be drawn wherever necessary.
4) Graph papers will be supplied if required.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) Cusum control charts were originated in _____.
   a) 1950s b) 1960s
   c) 1920s d) 1980s

2) Which of these is a reason, why the Cusum charts are better than the Shewhart control charts?
   a) Because they are having information about only one sample.
   b) Because the quantity plotted on the Shewhart control charts is variable.
   c) Because the quantity plotted on the Cusum chart contains information about more than one sample.
   d) Because the quantity plotted on the Cusum control charts is containing information about a single sample.

3) What is the full form of E in the EWMA chart?
   a) Exponentially b) Experimentally
   c) Exactly d) Estimated

4) EWMA charts are better than Shewhart control charts in detecting the _____ shift.
   a) Large process b) Medium process
   c) Small process d) Every process

5) What DMAIC process does is, to _____?
   a) Manufacture any product
   b) Define specification limits for a product.
   c) Solve root cause of quality and process problems.
   d) Define quality system standards.

6) The purpose of Acceptance sampling is to _____.
   a) Sentence lots b) Estimate lot quality
   c) Estimate lot defectives d) Estimate lot conformity

7) What is done in single sampling plan?
   a) Only one unit is checked
   b) Only the first lot is checked 100%
   c) Only n samples of 1 unit are checked
   d) Only one sample of n units is checked.

8) In acceptance sampling, when there is a finite probability that the lot may be accepted even if the quality is not really good, is called _____.
   a) Consumer's risk b) Producer's risk
   c) Operator's risk d) Owner's risk

9) Which of these is not a part of magnificent seven of SPC?
   a) Pareto chart b) Check Sheet
   c) Scatter Diagram d) 2k factorial design

10) Pareto chart identifies the _____ defects not the _____ defects.
   a) The most important, the most frequent.
   b) The most frequent, the most important.
   c) The smallest defects, the largest defects.
   d) The largest defects, the smallest defects.

11) A set of components whose functioning ensures the functioning of the system is known as _____.
   a) path set b) cut set
   c) minimal path set d) minimal cut set

12) The structure function of a binary system S takes any one of _____ possible values.
   a) 4 b) 2
   c) 3 d) None of these

13) A binary system S of 2 components has _____ number of possible state vectors.
   a) 1 b) 2
   c) 3 d) 4

14) Exponential distribution is _____.
   a) IFR b) DFR
   c) Both a and b d) none of these

Q.2 A) Answer the following questions. (Any Four) **08**

1) What is the meaning of Quality?
2) What is Producer's risk?
3) What is ASN?
4) Define a series system.
5) Define a structure function of a system of n components.

B) Answer the following questions (Any Two) **06**

1) What is the value of upper control limit for the period $i = 1$ for a EWMA chart which has value of $\lambda = 0.10, L = 2.7, \sigma = 1$ and the value of $\mu o = 10$.
2) If the value of $\bar{x}_i = 9.29$ and $C_{i-1} = -2.56$, what will be the value of the cumulative sum C_i for this sample, if the value of $\mu_0 = 10$.
3) In a single sampling plan if sample size *n* = 10, acceptance number $C = 2$, and lot quality $p = 0.08$, find the probability of accepting the lot by using binomial distribution.

Q.3 A) Answer the following questions. (Any Two) **08**

1) Find the structure function of a parallel system of n components.
2) Find the reliability of a parallel system of 2 independent components whose reliabilities are $p_1 = p_2 = 0.25$
3) Define LTPD.

B) Answer the following questions. (Any One) **06**

1) What are the advantages of acceptance sampling?
2) Write a note on DMAIC cycle.

Q.4 A) Answer the following questions. (Any Two) **10**

1) Write a note on a magnificent tool of quality- Control Chart.
2) Write a note on a magnificent tool of quality- cause and effect diagram.
3) Show that hazard rate of a series system of components having independent life times is summation of component hazard rates.

B) Answer the following questions. (Any One) **04**

1) State the control limits of EWMA control chart for monitoring process mean.
2) In reliability theory, when a system is said to be coherent?

Q.5 Answer the following questions. (Any Two) **14**

1) Explain the Tabular CUSUM for monitoring the process mean.
2) Write a procedure of single sampling plan.
3) Find the failure rate function (hazard rate) for a 2-out-of-3 system, where components are independent and life time T_1 of i^{th} component is exponentially distributed with mean 100 hrs, for $i = 1,2,3$.