## SARDAR PATEL UNIVERSITY

**M.Sc. (Applied Statistics) Semester II**
**PS02CAST23 : (Statistical Quality Control and Reliability)**
**23rd October 2018, Tuesday**

Time: 10:00 AM – 01:00 PM

Total Marks: 70

**Q.1)  Multiple Choice Questions.**                                         [08]

1) If the lower value of p-chart is negative value, it is ....
   - a) Eliminated from the chart
   - b) We have collect more sample
   - c) Treated as negative only
   - d) Equated to zero

2) When (USL –LSL) is greater than (UNTL-LNTL) then value of PCR is ...
   - a) >1
   - b) < 1
   - c) 1
   - d) None of the above

3) Confirmed finished product's parameter changes from product to product due to ....
   - a) Chance Causes
   - b) Assignable cause
   - c) Natural Cause
   - d) All of the above

4) For an acceptance sampling plan $P_a = 0.9957$, N=5000 and n = 60, value of ATI = ...
   - a) 80
   - b) 84
   - c) 81
   - d) None of the above

5) ......is the major cause of reliable product.
   - a) Fewer components in product
   - b) Increasing complexity in product
   - c) Both (a) and (b)
   - d) None of above

6) A .... is extremely helpful in identifying controllable input factors that influencing output quality characteristics.
   - a) Statistical Process control
   - b) Designed Experiments
   - c) Rectifying Inspection
   - d) Acceptance sampling

7) In double sampling plan, second sample is taken when the no. of defectives ....
   - a) Exceeds $C_2$
   - b) Exceeds $C_1$ but not $C_2$
   - c) Does not Exceeds $C_1$
   - d) Exceeds $C_1$ and $C_2$

8) Quality cost associated with measuring, yield losses, and training is called ....
   - a) Appraisal Cost
   - b) Internal Failure cost
   - c) Prevention cost
   - d) All of the above

**Q.2)  Answer any seven.**                                                  [14]

i) Distinguish between variable and attribute control charts.

ii) Explain in detail internal failure costs.

iii) Discuss rational subgroup approaches.

iv) Define the term; Quality, Nonconformity, Defective and Nominal value.

v) Give the control limits for $\overline{X}$ and S –chart.

vi) What is the ideal nature of the of OC curve?

vii) List the situations for control chart where process is out of control process.

viii) Discuss fault tree analysis.

ix) A certain type of component has a uniform failure rate of $10^{-5}$ per hour. What is its reliability for a specified period of service of $9 \times 10^3$ hours?

(P-7, o.)

①

**Q.3)(a)** Define reliability. Explain bath tub curve. [06]

**(b)** Find the structure function for the following block diagram, [06]
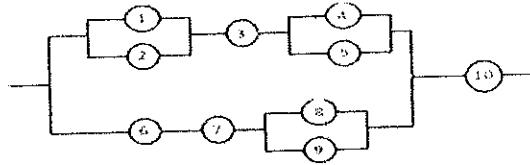


If the functioning probability of each component is 0.75 then find reliability of system.

==OR==

**(b)** The mean life of equipment is given to be 100 hours. Find the probabilities of successful [06] operations for the number of hours indicated: Mission time (hours) : 100, 50, 200, 25, 10 Using the reliability function Rs (t) = exp (-t/θ), sketch a survival curve for equipment.

**Q.4)(a)** Explain process capability for centered and off centered process. [06]

**(b)** Discuss the construction p and np chart. [06]

==OR==

**(b)** Discuss the construction of C and U chart. [06]

**Q.5)(a)** Summarize contribution of W.E. Deming to quality management. [06]

**(b)** List magnificent seven problem solving tools, explain any three of them. [06]

==OR==

**(b)** Explain components of product quality that evaluate product characteristics. [06]

**Q.6)(a)** Discuss single and double sampling plans. [06]

**(b)** Explain in detail [06]

    i) Skip-Lot sampling plan

    ii) CSP-I sampling plan

==OR==

**(b)** Explain in detail [06]

    i) OC curve

    ii) Sequential sampling plans.

—X—

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