Register No.:

9005

October 2025

Time – Two hours
(Maximum Marks: 60)

N.B.
1. Answer all questions under Part-A. Each question carries 1 mark.
2. Answer any 5 questions under Part-B. Each question carries 2 marks.
3. Answer any 3 questions under Part-C. Each question carries 10 marks.

PART – A

1. Which type of control helps in reducing rework and waste?
   a) Product control
   b) Sales control
   c) Process control
   d) Budget control

2. A process shows frequent points between warning and control limits. The engineer should
   a) Expand inspection hours to increase sampling rates
   b) Adjust operator shifts to improve workforce balance
   c) Modify production rates to match customer orders
   d) Investigate early signals to prevent assignable causes

3. Special cause variation can be detected using :
   a) Visual inspection
   b) Process mapping
   c) Pareto diagrams
   d) Control charts

4. If a control chart shows a sudden point outside the 3σ limit, the immediate action is to
   a) Identify and revise the periodic marketing schedule
   b) Identify and eliminate the assignable variation quickly
   c) Identify and redesign the supplier ordering cycle
   d) Identify and reorganize the administrative workflow

5. If σ chart signals instability while $\bar{x}$ chart looks normal, this implies
   a) Variation is stable but centre is misaligned
   b) Variation is seasonal but centre is perfect
   c) Variation is random but centre is drifting
   d) Variation is increasing but centre is stable

6. What is the primary purpose of an R chart?
   a) To monitor the variation within subgroups
   b) To monitor defects per unit
   c) To monitor the average of a process
   d) To calculate customer satisfaction

7. Which of the following control charts is used for monitoring the proportion of defective items in a process?
   a) c-chart
   b) p-chart
   c) np-chart
   d) u-chart

8. The p chart is preferred over the np chart when
   a) Sample batches remain equal during checks
   b) Sample patterns remain equal during checks
   c) Sample sizes vary across inspection cycles
   d) Sample trends vary across management plans

9. In a normal distribution, the mean, median, and mode are
   a) Equal
   b) Mean > Median > Mode
   c) Randomly located
   d) All different

10. Identify the function of ABC analysis.
    a) Groups items by expiry and usability
    b) Sorts inventory by supplier location codes
    c) Prioritizes items by physical storage size
    d) Ranks items by annual usage value

11. The gamma distribution is :
    a) Symmetric
    b) Always skewed right
    c) Always skewed left
    d) Uniform

12. Apply discounting concept in capital budgeting.
    a) Converts nominal amounts to indexed values
    b) Uses future cash to estimate tax liabilities
    c) Converts expected future cash to present value
    d) Measures book value changes for assets

13. Producer's risk is denoted by which Greek letter?
    a) β (beta)
    b) γ (gamma)
    c) α (alpha)
    d) δ (delta)

14. Interpret the purpose of AOQ curve.
    a) Displays cost of routine product testing
    b) Displays defects per machine cycle
    c) Displays outgoing quality after screening
    d) Displays input cost from suppliers

15. Apply the concept of OC curve interpretation.
    a) Choose supplier based on travel time
    b) Evaluate lot quality acceptance probability
    c) Select audit team for monthly verification
    d) Adjust packaging method for shipment

16. If a sampling plan has high consumer's risk, it means :
    a) Bad lots are often accepted
    b) Good lots are often rejected
    c) Sample size is very large
    d) Inspection is 100%

17. Interpret the role of first-sample acceptance number.
    a) Encourages routine shipment consolidation
    b) Encourages change in packaging schedule
    c) Determines decision after initial sample
    d) Determines the yearly audit requirement

18. In double sampling plan, how many samples are taken at most?
    a) One
    b) Two
    c) Three
    d) Unlimted

19. What does ‘SPRT’ stand for in sequential sampling?
    a) Standard Probability Ratio Test
    b) Sequential Probability Ratio Test
    c) Sample Process Ratio Technique
    d) Statistical Process Ratio Test

20. Apply sequential sampling to reduce inspection effort.
    a) Record identical results for every product
    b) Increase sample count for each new order
    c) Evaluate each unit with complete rework
    d) Stop early if evidence supports acceptance

PART – B

21. What is meant by "Quality of Conformance"?
22. Differentiate between process control and product control.
23. Define the term "process variability".
24. List the difference between R-chart and σ-chart.
25. Given rare defects in a large output, apply distribution knowledge to select Poisson or Binomial.
26. Mention any two properties of a normal distribution.
27. What is AQL?
28. Given two sample results, apply decision rules to complete a double sampling plan.

PART – C

29. Discuss the need for Statistical Quality Control techniques in modern industry.
30. A process has varying sample sizes. Apply the method of constructing a p-chart and interpret control status.
31. Define the normal distribution and describe its properties. Why is it so widely used in process capability studies?
32. Apply the concepts of ASN and ATI to evaluate inspection effort required under specific sampling conditions.
33. Derive the ASN function for Sequential Sampling Plan. Plot ASN curve and compare with Single and Double Sampling Plans.
