22STP418N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2025
(Fourth Semester)

Branch: **STATISTICS**

STATISTICAL QUALITY CONTROL

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The $\bar{X}$– chart is used to monitor which of the following? a) variability in a process b) proportion of defective c) central tendency of a process d) count of defective	K1	CO1
	2	One way to reduce common cause of variation in a process is by a) increasing the number of inspections b) improving overall system design and process capability c) finding and removing specific assignable causes d) replacing all operators regularly	K2	CO1
2	3	The geometric moving average control chart is particularly useful in monitoring a) process with high defect rates b) process with rare non-conforming events c) Time-series forecasting models d) large sample size inspection	K1	CO2
	4	What do the arms of the V- mask represent in a control chart? a) the expected process variability b) the upper and lower control limits c) the acceptable and unacceptable shifts in the mean d) the range of common cause variation	K2	CO1
3	5	Which of the following sampling plans is the most flexible in terms of decision making? a) single sampling b) double sampling c) multiple sampling d) sequential sampling	K1	CO2
	6	Identity the CSP method which is best suited for a stable and well-controlled production process? a) CSP-1 b)CSP-2 c) CSP-3 d) none	K2	CO1
4	7	What does the Acceptable Quality Level (AQL) represents in MIL-STD 414? a) the highest defect rate that can be acceptable b) the lowest defect rate in a batch c) the average number of defective units in a sample d) the maximum allowable variation in the process	K1	CO2
	8	Which statistical distribution is assumed in variable sampling plan? a) Binomial b) Poisson c) Exponential d) Normal	K2	CO1

Cont....

5	9	The survival function R(t) is monotone decreasing continuous function with a) $R(0) = 0$ and $R(\infty) = 1$ b) $R(0) = 0$ and $R(\infty) = 0$ c) $R(0) = 1$ and $R(\infty) = 0$ d) $R(0) = 1$ and $R(\infty) = 1$	K1	CO2
	10	The standard Weibull distribution reduces to an exponential distribution , when the shape parameter takes the value a) 0 b) 1 c) 2 d) 3	K2	CO2

SECTION – B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks $(5 \times 7 = 35)$

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the construction of control chart for fraction defectives.	K3	CO2
		(OR)		
	11.b.	Briefly explain two main causes of variation in quality with example.		
2	12.a.	Distinguish between individual and group control charts. Also mention their uses.	K4	CO3
		(OR)		
	12.b.	Compare CUSUM control charts with that of Shewhart's control charts.		
3	13.a.	Delineate about acceptance sampling plan. State its uses in Manufacturing Industry.	K4	CO3
		(OR)		
	13.b.	Describe the operating procedure of CSP-3.		
4	14.a.	Obtain the expression for OC function of a sequential sampling plan.	K3	CO3
		(OR)		
	14.b.	Explain the purpose and importance of MIL-STD 414 tables in quality control.		
5	15.a.	Show that exponential distribution has constant hazard rate.	K5	CO4
		(OR)		
	15.b.	Discuss the method of estimation using failure rate estimator.		

SECTION –C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks $(3 \times 10 = 30)$

Module No.	Question No.	Question	K Level	CO
1	16	Elaborate about statistical quality control. Describe its scope in various industries with example.	K3	CO1
2	17	Explain the method of fitting V-mask in CUSUM chart.	K3	CO2
3	18	Describe the operating procedure of DSP, with flow chart.	K4	CO3
4	19	Derive one sided known sigma variable single sampling plan for the parameters.	K4	CO3
5	20	What is an life testing experiment? State the distribution used in that experiment. Discuss about censored sampling IFR & DFR.	K5	CO4

Z-Z-Z END