

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	Which of the following is an example of common cause variation? a) A machine tool gradually wearing out b) A sudden power failure stopping production c) A new operator making frequent mistakes d) A batch of defective raw material	K1	CO1
	2	The np-chart differs from the p-chart because it a) monitors the proportion of defects instead of count b) requires a fixed sample size c) uses variable sample size d) tracks the number of defects per unit	K2	CO1
2	3	The moving average control chart is most suitable for which type of process? a) highly variable process with unpredictable changes b) stable process with gradual shifts c) process with frequent special causes of variation d) process with only attribute data	K1	CO1
	4	Recall the main advantage of a CUSUM control chart over a Shewhart $\bar{X}$ -chart a) it reacts faster to small process shifts b) it require fewer data points c) it only detects large variation in data d) it does not require control limits	K2	CO1
3	5	When is a double sampling plan most beneficial? a) when inspection costs are low b) when quick decisions are required in all cases c) when sampling and inspection costs are high d) when all items must be checked	K1	CO1
	6	In a CSP-1 plan, when is 100% inspection required? a) always b) at the start of the production or after detecting a defect c) only when a lot is rejected d) when the customer requests it	K2	CO2
4	7	Identify the table in MIL-STD 414 that helps to determine the appropriate sample size? a) Table I b) Table II c) Table III d) Table IV	K1	CO2
	8	In MIL-STD 414 table, the focal point (AQL) ranges from. a) 0.03 to 12% b) 0.04 to 15% c) 0.05 to 20% d) 0.06 to 10%	K2	CO2
5	9	The hazard rate or failure rate function $h(t)$ of the distribution function F is defined as a) $h(t) = \frac{f(t)}{1-F(t)}$ b) $h(t) = \frac{1-F(t)}{f(t)}$ c) $h(t) = \frac{1-f(t)}{F(t)}$ d) $h(t) = \frac{f(t)}{F(t)}$	K1	CO4
	10	In a system with two independent components in parallel having reliability of 0.7 and 0.6, what is the system reliability? a) 0.42 b) 0.1 c) 1.3 d) 0.88	K2	CO4

Cont...

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the meaning and the scope of Statistical Quality Control.	K2	CO1
		(OR)		
	11.b.	Describe the construction of σ - chart and what situation it is used?		
2	12.a.	Elaborate how the control charts for moving averages are constructed.	K3	CO1
		(OR)		
	12.b.	Describe the V-mask control scheme.		
3	13.a.	State the situations in which acceptance sampling is preferable and also mention its advantages.	K3	CO2
		(OR)		
	13.b.	Write the assumptions clearly and the operating procedure of CSP-II.		
4	14.a.	Explain how will you obtain n and k for a variable sampling plan with known sigma.	K4	CO3
		(OR)		
	14.b.	Mention the five points to draw OC curve for sequential sampling plan and construct the curve.		
5	15.a.	If a system has one component with Weibull distribution , derive the failure rate of the system.	K5	CO4
		(OR)		
	15.b.	Elaborate IFR, DFR and its role in bath tub curve.		

SECTION -C (30 Marks)

Answer ANY THREE questions
ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Bring out the procedure for construction of $\bar{X}$ and R charts.	K3	CO1
2	17	Describe the construction of two-sided CUSUM control charts.	K3	CO1
3	18	Obtain the expression for OC and AOQ for attribute single sampling plan.	K4	CO3
4	19	Derive one sided unknown sigma variable sampling plan.	K4	CO3
5	20	Estimate the parameter using MLE of exponential distribution and its reliability.	K5	CO4

Z-Z-Z

END