



Answer the following questions

(30Marks)

Question One

A - A company wants to have a variable sampling plan that will not accept a shipment of polyester material, more than 10% of the time, if the lot average tensile strength is 95 psi or less. In the meantime, this company would like to have at least 95% of chance to accept a submitted lot with mean strength of 115 psi or more. The standard deviation of this polyester material is given as 20 psi. AQL = 115 psi, RQL = 95 psi, alpha = 5%, beta = 10%
 Find sample size, n, and acceptance level, if the sample has an average tensile strength less than the acceptance level, the lot is rejected; otherwise, it is accepted. (a1) (b2) (15 Marks)

B - A company wants to have a variable sampling plan that can be used to determine the disposition of lots of polyester material which has a lower specification limit of 90 psi. The plan shall not accept, more than 10% of the time, a lot with a fraction nonconforming that is 8% or more. In the meantime, it would like to have at least 95% of chance to accept a submitted lot with a fraction nonconforming of 1% or less. The standard deviation of this polyester material is given as 20 psi. LSL = 90 psi, AQL = p1 = 1%, RQL = p2 = 8%, alpha = 5%, beta = 10%
 Find the sample size n, mean and the critical distance K. (a2) (b2) (15 Marks)

Question Two

(20 Marks)

A - Explaining Changes in the OC Curve - Effects of Increasing Sample Size While Holding Acceptance Number Constant - Effects of Increasing Acceptance Number While Holding Sample Size Constant (c3) (5 Marks)

B - Construct the AOQ curve for N = 500, n = 10, and c = 1. Let values of p vary from .05 to .40 in steps of .05. Find AOQL (a1) (b2) (15 Marks)

		PROPORTION DEFECTIVE, p									
n	x	.05	.10	.15	.20	.25	.30	.35	.40	.45	
10	0	.5987	.3487	.1969	.1074	.0563	.0282	.0135	.0060	.0025	
c = 1	1	.9139	.7361	.5443	.3758	.2440	.1493	.0860	.0464	.0233	
	2	.9885	.9298	.8202	.6778	.5256	.3828	.2616	.1673	.0996	
	3	.9990	.9872	.9500	.8791	.7759	.6496	.5138	.3823	.2660	

(30 Marks)

Question Three

A company wants to have a single sampling plan that will not accept, more than 10% of the time, material that is 8% defective or worse. In the meantime, this company would like to have at least 95% of chance to accept a submitted lot with 1% or less nonconforming. AQL = p1 = 1%, Producer's risk, 5% -RQL = p2 = 8%, Consumer's risk, 10%

A - Find sample size, n, and acceptance level, c. (b2) (15 Marks)

B - Draw the OC curve associated with the selected plan (a2) (15 Marks)

c acceptance level	p_1n ($P_a=0.95$)	p_2n ($P_a=0.10$)	p_2/p_1
0	0.051	2.30	45.10
1	0.355	3.89	10.96
2	0.818	5.32	6.50
3	1.366	6.68	4.89

Question Four

(20 Marks)

A manufacturer receives large batches of components daily and decides to institute an acceptance sampling scheme. Three possible plans are considered, each of which requires a sample of 30 components to be tested:

Plan A: Accept the batch if no non-conforming components are found, otherwise reject.

Plan B: Accept the batch if not more than one non-conforming component is found, otherwise reject.

Plan C: Accept the batch if two or fewer non-conforming components are found, otherwise reject.

A -For each plan, calculate the probability of accepting a batch Containing (i) 2% non-conforming (ii) 8% non-conforming. (a1) (b2) (10 Marks)

B - Without further calculation sketch on the same axes the operating characteristic of each plan. (a1) (5 Marks)

C - Which plan would be most appropriate in each of the circumstances listed below? (b7) (c4) (5 Marks)

(i) There should be a high probability of accepting batches containing 2% non-conforming.

(ii) There should be a high probability of rejecting batches containing 8% non-conforming.

(iii) A balance is required between the risk of accepting batches containing 8% defective and the risk of rejecting batches containing 2% non-conforming.

Members of course examination committee.

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With our best wishes

This exam measures the following ILOs										
Question Number	Q1-A, Q2-B, Q4-A,B	Q1-B, Q3-B,			Q1-A,B, Q2-B, Q3-A,Q4-A	,Q4-C		Q2-A	Q4-C	
Skills	a1	a2	a3	b1	b2	b7		C3	C4	
	Knowledge & Understanding Skills			Intellectual Skills				Professional Skills		