Reg. No.												

Question Paper Code	11860

12 JUN 2023

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Sixth Semester

Production Engineering

20MEEL717 – STATISTICAL QUALITY CONTROL AND RELIABILITY ENGINEERING

(Regulations 2020)

(Use of Statistical and Sampling Tables are permitted)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Define the term Quality.	*2,K1,CO1*
2.	Contrast between change cause and assignable cause.	*2,K2,CO1*
3.	What is a control chart?	*2,K1,CO2*
4.	List out the formulae for CP and CPK.	*2,K1,CO2*
5.	List out the three approaches to lot sampling.	*2,K1,CO3*
6.	Paraphrase the term random sampling.	*2,K1,CO3*
7.	Define the term maintainability.	*2,K1,CO4*
8.	List of the different types of availability.	*2,K1,CO4*
9.	What is Reliability Block Diagram (RBD)?	*2,K1,CO5*
10.	Define MTBF.	*2,K1;CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	What is quality loss? Explain the same in detail.	*13,K2,CO1*
		OR	
	b)	On what basis will you interpret a control chart? Explain with suitable diagrams substantiating your explanation.	*13,K2,CO1*
12.	a)	In detail discuss about the different types of control charts for attributes.	*13,K2,CO2*
		OR	
	b)	Small boxes of cereal are labeled 10 gms. Each hour random samples of size n = 4 boxes are checked for weight. Use these data to construct a X bar and R chart. ($A_2 = 0.73$, $D_3 = 0$, $D_4 = 2.28$).	*13,K3,CO2*

Time	Box1	Box2	Box3	Box4
9 am	9.8	10.4	9.9	10.3
10 am	10.1	10.2	9.9	9.8
11 am	9.9	10.5	10.3	10.1
12 noon	9.7	9.8	10.3	10.2
1 pm	9.7	10.1	9.9	9.9

13. a) Write short notes on AQL, LTPD and AOQL. *13,K2,CO3*

OR

b) Elucidate the process of drawing an OC curve with an example. *13,K2,CO3*

14. a) Explain the various steps in failure data analysis with suitable examples. *13,K2,CO4*

OR

b) 50 components are tested for two weeks. 20 of them fail in this time, with an average failure time of 1.2 weeks. Calculate the mean time till failure assuming a constant failure rate. *13,K3,CO4*

15. a) A system has three parallel components, A, B, and C with reliabilities 0.95, 0.92, and 0.90, respectively. Find the reliability of the system and also find the system reliability if C is out of order. *13,K3,CO5*

OR

b) How will you find out reliability of systems connected in series and parallel combined? Explain with help of neat sketches. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Discuss the single sampling plan for N=10,000. n=89 and c = 2 with a suitable diagram. *15,K3,CO6*

OR

b) Two units of a system, A and B have reliabilities of 0.9 and 0.50 respectively. Determine the reliability for the following configurations: (i) A and B are cascaded (ii) A and B are cascaded and Redundant (iii) A and B are cascaded and only B as Redundant. (iv) A and B are cascaded and the cascaded combinations has group redundancy. *15,K3,CO6*