QP Code: RM22BTECH159 | Reg. No | | | | | | | | | | | AY 22

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester Regular) Examinations, May – 2024

22BMEPC24004 - Quality Control and Reliability

(Mechanical)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Explain the difference between product quality and service quality.	CO1	K2
b. What are some common statistical tools used in SQC	CO1	K2
c. How does statistical process control (SPC) improve quality?	CO3	K4
d. Write the significance of ISO 9000 .	CO2	K2
e. Define "Mean Time Between Failures".	CO4	K2

PART – B **(15 x 4=60 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. Evaluate the importance of quality in achieving a competitive advantage.	7	CO1	K4
b. Discuss the concept of quality circles in detail.	8	CO1	K2
(OR)			
c. Compare and contrast control charts used in statistical process control.	7	CO3	K4
d. A company manufactures light bulbs. To monitor the defect rate, a quality control inspector randomly samples 20 light bulbs every hour and checks them for functionality. Here's the defect data for the first four hours of production:	8	CO3	K4

Sample	Number of Defective Bulbs
1	3
2	2
3	5
4	1

Calculate the proportion (p) of defective bulbs for each sample. Construct a p-chart for the data. Analyze the chart to assess the process stability for the light bulb defect rate.

3.a.	Design a sampling plan for inspecting incoming materials based on statistical principles.	7	CO2	K3
b.	Describe the shape of an OC curve and explain its significance in quality control.	8	CO2	K4
	(OR)			
c.	Discuss the differences between AQL, LTPD, and AOQL in the context of quality control.	8	CO3	K2
d.	Compare and contrast the concepts of acceptance quality and lot tolerance percent defective.	7	CO1	K2

4.a.	Evaluate the effectiveness of various quality improvement methodologies.	7	CO2	K4
b.	Compare and contrast the advantages and disadvantages of different sampling plans.	8	CO2	K4
	(OR)			
c.	Analyze the impact of quality management on employee morale and job satisfaction.	7	CO2	K4
d.	Briefly explain the concept of double sampling plans and their advantages compared to single sampling plans.	8	CO3	K3
5.a.	How do you interpret different shapes of the Weibull distribution? Explain briefly.	7	CO4	K4
b.	In a car manufacturing process, four critical components (A, B, C, D) are arranged both in series and in parallel to ensure reliability. The reliability of each component is as follows: A (0.95), B (0.90), C (0.85), and D (0.80). Calculate the overall reliability of the system when the components are arranged in both series and parallel configurations.	8	CO4	K4
	(OR)			
c.	Compare and contrast system reliability in series and parallel configurations, highlighting their respective advantages, disadvantages, and real-world applications.	7	CO4	K4
d.	Imagine an industry manufacturing a flashlight with two independent components: a battery (B) and a bulb (L). The battery (B) has a reliability (success chance) of 90% . The bulb (L) has a reliability of 80% . We want to compare the overall system reliability (chance the flashlight works) in two configurations: (i) Series: Battery and bulb are connected in series. The flashlight only works if both B and L function. (ii) Parallel: Battery and bulb are connected in parallel. The flashlight works as long as at least one of them (B or L) is functional. Now find the probability of the flashlight working in the series configuration and also find the probability of the flashlight if it will work in the parallel configuration? Provide a suggestion in which the industry will design the connection for the system.	8	CO4	K4

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