UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2017

Program: B.Tech Mechanical
Subject (Course): Quality, Reliability & Safety
Course Code : MTEG 371
No. of page/s: 2

Semester – V
Max. Marks : 100
Duration : 3 Hrs.

Section A: 5 marks each (Attempt all questions)

1) State the Obstacles associated with TQM Implementation?
2) Describe the Skip lot Sampling plan with an example.
3) According to Deming, explain the drawbacks of setting up numerical goals. Explain the deadly diseases mentioned by Deming.
4) Name all the graphical methods of data presentation and describe the method which shows relationship between the variables.

Section B: 4X10=40 (Attempt any one part from Q8)

5) The producer of a product views the quality of the product differently from the customer that uses that product. First, define the producer's view of quality, and the customer's view of quality. Second, list the characteristics of the product produced from both the producer's view and customer's view.
6) A production manager at a tire manufacturing plant has inspected the number of defective tires in twenty random samples with twenty observations each. Following are the number of defective tires found in each sample: Construct a p control chart with this information

| Sample Number	No. of defective tyres	No. of observations sampled	Sample Number	No. of defective tyres	No. of observations sampled
1	3	20	11	3	20
2	2	20	12	2	20
3	1	20	13	2	20
4	2	20	14	1	20
5	1	20	15	1	20
6	3	20	16	2	20
7	3	20	17	4	20
8	2	20	18	3	20
9	1	20	19	1	20
10	2	20	20	1	20

7) Consider a single sampling plan with a lot size of 1500, sample size of 150, and acceptance number of 3. Construct the OC curve. If the acceptable quality level is 0.05% nonconforming and the limiting quality level is 6% nonconforming, describe the protection offered by the plan at these quality levels.

ii) Answer the same questions for the sampling plan N = 1500,n = 200, c = 3. Discuss the degree of protection of this plan compared to that in above part.

8) Explain in detail about sampling & how we can measure the performance of the sampling plan. What is the selection criterion of the sampling plan?

OR

Discuss the need of Reliability engineering in Industry and explain the Failure rate , MTTF, MTBF, MTTR , Maintainability and the Availability.

Section C: 40 marks each (Attempt any one part from Q10)

9) Determine single sampling plans that will accept lots that are 0.8% nonconforming with a probability of 0.96. Use acceptance numbers of 1, 3, and 4. If we desire batches that are 5% nonconforming to be accepted with a probability of no more than 0.04, which of the plans above would be preferable? Will the plan meet this criterion?

10) Consider the seven-component system shown in Figure. The reliabilities of the components are as follows: $R_A = 0.96$, $R_B = 0.92$, $R_C = 0.94$, $R_D = 0.89$, $R_E = 0.95$, $R_F = 0.88$, $R_G = 0.90$.

a) Find the reliability of the system. If you had a choice of improving system reliability by modifying any two components, how would you proceed?
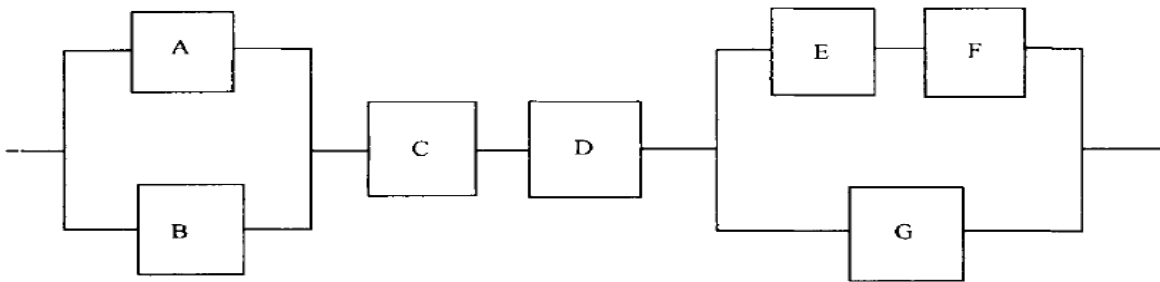
b) Assume that the time to failure for each component has an exponential distribution. The failure rates are as follows: $\lambda_A = 0.0005$/hour, $\lambda_B = 0.0005$/hour, $\lambda_C = 0.0003$/h, $\lambda_D = 0.0008$/hour, $\lambda_E = 0.0004$/hour, $\lambda_F = 0.006$/hour and $\lambda_G = 0.0064$/hour. Find the reliability of the system after 1000 hours. What is the mean time to failure of the system?

OR

Explain the following:

a) Operation & Inspection of Fire Extinguishers
b) Safety Performance Measurement
c) Accidents Reporting & Investigation
d) Safety consideration in welding equipment