Total No. of Questions :8] *[Total No. of Printed Pages :4*

Roll No .....

AU/ME-801(C)

B.E. VIII Semester

Examination, June 2017

Reliability and Maintenance

(Elective - III)

Time : Three Hours

Maximum Marks : 70

Note: i) Answer any five questions. All questions carry equal marks.

ii) Illustrate your answer with neat sketches wherever necessary.

1. a) Explain the basic concepts of reliability. Draw and explain the failure rate curve for industrial products.

   b) What is meant by MTBF and MTTR? Explain the difference between hazard rate function and reliability function in reliability.

2. a) In the life testing of 10 elements of a mixture, the time to failure for each element is as below. Calculate the mean failure rate for 905 hours and the mean time to failure for all the elements.

Element Number	Time to failure in hours
1	800
2	805
3	810
4	815
5	820
6	827
7	838
8	848
9	875
10	905

   b) Differentiate between failure rate and hazard rate and establish relation between them. Also express reliability as function of hazard rate.

3. a) Explain the Markov analysis. Explain Tie Set and Cut Set method of reliability evaluation.

   b) A Four units are connected in series with reliabilities $R_1 = 0.83$, $R_2 = 0.89$, $R_3 = 0.79$ and $R_4 = 0.97$. Calculate the system reliability. If the reliability is to be increased to a value of 0.65, how should this be apportioned among the four units according to minimum effort method.

4. a) Define the term Overall Equipment Effectiveness (OEE) and establish relation between quality, reliability, maintainability and availability.

   b) Explain the major function of maintenance section in an organization along with its objectives. What is design out maintenance.

5. a) What is productive maintenance? Differentiate between shutdown maintenance and scheduled maintenance.

   b) What is condition monitoring? Explain visual condition monitoring technique.

6. a) Discuss the corrosion monitoring procedure and possible outcomes of such analysis as an aid to identify the need of maintenance.

   b) What is vibration analysis and what are its principle? How is it used for equipment health monitoring?

7. a) Explain Reliability Centered Maintenance (RCM)? Explain its working with a flow diagram.

   b) Explain the concept, evolution and objective Total Productive Maintenance (TPM).

8. a) Explain the Failure Modes and Effects Analysis (FMEA)? What are the application and benefits.

   b) Explain the Failure Modes, Effects and Criticality Analysis (FMECA)? What are the application and benefits.

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