

Roll No .....

**EI/IC-7101**

**B.E. VII Semester**

**Examination, December 2016**

**Safety and Reliability Engineering**

**Time : Three Hours**

**Maximum Marks : 70**

**Note:** Attempt any five questions. All questions carry equal marks. Assume suitable data or dimensions, if necessary, clearly mentioned it.

1. a) What do you mean by safety? Discuss four main objectives of safety programmes.  
b) Give the classification of failures and discuss the safety measures for that.
2. a) Discuss the various techniques for reliability improvements.  
b) What is reliability testing? Enumerate the types of tests used to evaluate a design.
3. a) What is Quality? Explain the quality control design procedure.  
b) Explain with line diagram a typical medium scale organization for quality.
4. a) Discuss the Stress-strength approach for reliability design.  
b) What is meant by reliability design? Illustrate with one live example.

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5. a) What do you mean by redundancy? Why is it necessary? Explain the difference between active and passive redundancy.  
b) Explain with a neat sketch stand by redundant system in a system reliability analysis.
6. a) Discuss failure rate and hazard rate and their distribution for failure and reliability rates.  
b) Discuss in detail fault tree analysis and its qualitative and quantitative evaluation.
7. In a test involving continuous satisfactory performance of 110 gear boxes under excessive vibration conditions, the following failure frequencies were observed, the total test period being 8 hours :

Time Interval	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
No. of failures	3	16	22	42	11	9	4	3

  - i) Draw a frequency polygon showing the failure frequencies.
  - ii) Tabulate the values of failure rate, survival rate, and probability of survival.
8. Write short notes on following (any two) :
  - a) Safety codes and standards
  - b) Markov models
  - c) MTTF and MTBF
  - d) OC curve

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