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## M.Tech I Semester Supplementary Examinations August 2016

## MAINTENANCE & RELIABILITY ENGINEERING

(Refrigeration & Air Conditioning) (For students admitted in 2012, 2013, 2014 & 2015 only)

Time: 3 hours Max. Marks: 60

Answer any FIVE questions All questions carry equal marks

- (a) Define probability. Explain various types of probabilities.
  - (b) Write a note on Poisson distribution.
- 2 (a) Explain in brief any two types of hazard models.
  - (b) Sketch and explain bath tub curve.
- 3 (a) Derive an expression for reliability of a system for series configuration & parallel configuration.
  - (b) A system has 10 identical components in series. If the system reliability is 0.95, find reliability of each component.
- 4 (a) Define the following term with mathematical equation.
  - (i) MTBF.
  - (ii) MTTF.
  - (iii) MTTR.
  - (iv) Maintainability.
  - (b) Differentiate between availability and maintainability with the help of Markov graph.
- 5 (a) Define failure. Explain in brief different modes of failures.
  - (b) Define: (i) Failure density (f<sub>d</sub>).
    - (ii) Failure rate (z).
    - (iii) Mean failure rate (h).
    - (iv) Mean time to failure (MTTF).
- 6 (a) Differentiate between X-rays and gamma rays. Mention the applications of the same.
  - (b) Explain with neat sketch, production of X-ray.
- 7 (a) List out different types of maintenance and explain any two in brief.
  - (b) What is meant by condition monitoring? Explain in brief any two types of condition monitoring.
- 8 (a) Mention different reasons for wear monitoring. Explain any two methods of wear monitoring in brief.
  - (b) Explain in brief spectroscopic oil analysis.

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