| AE-320: Reliability & Maintenance Engineering | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **L** | **T** | **P** | Credit | Area | | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
| 3 | 0/1 | 2/0 | 4 | DEC | | 15/25 | 25/- | 20/25 | 40/50 | - |

**Objectives:** This course is designed to introduce the student with mathematics of reliability, system reliability assessment, availability and maintainability.

| AE-320: Reliability & Maintenance Engineering | | Contact Hours |
|---|---|---|
| **Unit-1** | **Introduction and Reliability Mathematics :** Relevance of reliability, availability and maintainability, definition of reliability, factors influencing system effectiveness, laws of probability, probability distributions; exponential Weibull normal, log normal, data collection recovery of data, Statistical analysis of failure data | **8** |
| **Unit-2** | **Fundamentals Of Reliability :** Various reliability related functions; probability density function, cumulative distribution function, reliability function and hazard rate; reliability models; constant rate, Weibull, normal and lognormal model | **6** |
| **Unit-3** | **System Reliability Assessment :** Types of systems- series, parallel, series-parallel, parallel-series, stand by and complex; method of reliability evaluation; cut set and tie set methods, event trees and fault trees methods, markov method, Reliability of repairable systems | **6** |
| **Unit-4** | **Reliability Improvements :** Methods of reliability improvements,; low level and high level redundancy, active , stand by and K-out-of-N redundancy, effect of maintenance | **8** |
| **Unit-5** | **Availability and Maintainability Assessments:** Point, mission and steady state availability. Availability assessment, Maintainability and its assessment. Maintenance policies | **8** |
| **Unit-6** | **Design for Reliability :** Reliability allocation, Design for reliability and maintainability, optimization of reliability and maintainability and their trade-off, Practical applications of RAM Engineering to systems, products and processes., Monte Carlo simulation | **6** |
| | **Total** | **42** |




| **Reference Books:** | |
|---|---|
| 1 | Ebeling CharlesE.,"An introduction to Reliability and Maintainability Engineering", Publisher: Tata McGraw-Hill Publishing Co. Ltd.,New Delhi(ISBN-13: 9780070188525), 1996 |
| 2 | Srinath,L.S." Reliability Engineering",PUBLISHER :Affiliated East – West Press Ltd., New Delhi(ISBN: 978-81-317-2121-6),1991 |
| 3 | Dhillon,B.S.,"EngineeringMaintainbility",PUBLISHER: Prentice Hall of India, New Delhi(ISBN: 9780080505688),1991 |
| 4 | Blanchard, Benjamin,S.,"Logistics Engineering and Management", PUBLISHER:Prentice Hall of India, New Delhi(ISBN: 9780131246997),2004 |

**Course Outcomes**

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|---|---|
| CO1 | To understand reliability, availability and maintainability and its probability distributions. |
| CO2 | To understand fundamentals of reliability |
| CO3 | To understand Types of systems, reliability evaluation methods. |
| CO4 | To understand different Methods of reliability improvements. |
| CO5 | To understand availability, maintainability ,Maintenance policiesand steady state availability |
| CO6 | To understand Design for reliability. |

**CO-PO/PSOMatrix**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 |
| CO5 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 |