

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
<b>4ME157 RELIABILITY ENGINEERING</b>	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: <b>3 Hours</b>				Min	35	25	25	25	110

**Objective and Pre requisites:** The objective of the subject to introduce the students about the new and advanced methods of problem solving skill by Reliability Engineering.

## COURSE CONTENT

### UNIT-1

#### Introduction

Definition of reliability, types of failures, definition and factors influencing system effectiveness, various parameters of system effectiveness.

### UNIT-2

#### Theory of Reliability

Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.

### UNIT-3

#### Reliability Mathematics

Definition of probability, laws of probability, conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis Procedures, empirical reliability calculations.

### UNIT-4

#### Optimum based Design

Introduction to optimum design, analysis of simple machine members based on optimum design. System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimensioning.

### UNIT-5

#### Reliability Improvements & Testing

Methods of reliability improvement, component redundancy, system redundancy, types of redundancies-series, parallel, series – parallel, stand by and hybrid, effect of maintenance.

**Note:** Only Data-books, Reliability Tables and certified notes are allowed in the examination hall.

### BOOKS RECOMMENDED:

- [1] Billinton R. & Allan R.N., *Reliability Evaluation of Engineering and Systems*, Plenum Press, 2003.
- [2] Kapoor. K.C., *Reliability in Engineering and Design*, John Wiley and Sons, 2001.
- [3] Sinha S.K., *Life Testing and Reliability Estimation*, Wiley Eastern Ltd, 2003.
- [4] Shooman M.L., *Probabilistic Reliability, An Engineering Approach*, McGraw Hill, 1998.
- [5] Sandler G.H., *System Reliability Engineering*, Prentice Hall, 2001.

**LABORATORY EXPERIMENTS:**

1. Design Analysis of Reliability of M/c component.
2. Problem based on Markov method of Reliability.
3. Optimum Design of M/c component.
4. Problem based on Weibull analysis of Reliability.
5. Problem based on Statistical analysis.