Devi Ahilya University, Indore, India **Institute of Engineering & Technology**				**IV Year B.E. (Mechanical Engg.)** **(Full Time)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
8MERE2	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
RELIABILITY ENGINEERING	**3**	**1**	**2**	**3**	**1**	**1**	**5**
Duration of Theory Paper: 3 Hours							

Course Objectives:

1. The objective of the subject is to acquaint the students about the Theory of Reliability.
2. The objective of the subject is to acquaint the students about design optimization of mechanical component.
3. The objective of the subject is to acquaint the students about the Statistical analysis.

Pre requisite(s): Machine Design, Mathematics I, II, III & IV.

COURSE CONTENTS

UNIT-I

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

UNIT-II

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-III

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-IV

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-V

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] Billintan R.& Allan R.N.., *Reliability Evaluation of Engineering and Systems*, Plenum Press,2003.
[2] Kapoor. K.C., *Reliability in Engineering and Design*, John Wiely and Sons, 2001.
[3] Sinha S.K., *Life Testing and Reliability Estimation*, Wiely 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.

Course Outcomes:

Upon Completing the Course, Student will able to:

CO1. Understand the principal of Reliability.
CO2. Understand the design optimization of mechanical component.
CO3. Understand the Weibull analysis, dimensioning.

LIST OF PRACTICAL ASSIGNMENTS

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

Course Objective:

1. The objective of the subject is to acquaint the students about the Theory of Reliability.
2. The objective of the subject is to acquaint the students about design optimization of mechanical component.
3. The objective of the subject is to acquaint the students about the Statistical analysis.

Course Outcome:

Students earned credits will develop ability to

CO. No.	CO	PO
CO1	Understand the principal of Reliability.	PO1, PO2, PO3
CO2	Understand the design optimization of mechanical component.	PO1, PO3, PO4, PO12
CO3	Understand the Weibull analysis, dimensioning.	PO1, PO2
CO4		
CO5		

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	3									
CO2	3		3	3								2
CO3	3	3										
CO4												
CO5												

* CO (rows) mention nil/very small/insignificant contribution to the PO(column)
1→ relevant and small significance 2 → medium or moderate and 3 →strong