RELIABILITY ENGINEERING

Course Code	20ME4703E	Year	IV	Semester	I
Course Category	Professional Elective-V	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	IEM
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes: Upon successful completion of the course, the student will be able to

	Statement	Skill	BTL	Units
CO1	Explain various concepts of Reliability.	Understand	L2	1,2,3,4,5
CO2	Illustrate different types of failure distributions.	Understand	L2	2
CO3	Interpret the knowledge of reliability prediction models	Understand	L2	3
CO4	Interpret the scope of risk assessment	Understand	L2	3
CO5	Apply different concepts of reliability management.	Apply	L3	4,5

Contribution of Course outcomes towards achievement of Program outcomes & Strength of correlations (High:3, Medium: 2, Low:1)

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

Syllabus

UNIT	Content	Mapped CO
I	**Reliability Concept**: Reliability function - failure rate - Mean time between failures (MTBF) -Mean time to failure (MTTF). **Reliability Life Testing –**: a priori and a posteriori concept - mortality curve - useful life Availability – maintainability Hazard Rate – system effectiveness.	**CO1**
II	**Reliability Data Analysis**: Time to failure distributions – statistical and reliability concept of failure data analysis, equipment replacement policy. **Parametric Life time Distributions**: Exponential, normal, Gamma, Weibull, Ranking of data - probability plotting techniques.	**CO1, CO2**
III	**Reliability Prediction Models**: Series and parallel systems - RBD approach - Standby systems -M/n configuration - Application of Baye's theorem - cut and tie set method - Markov analysis -FTA – Limitations. **Input Modeling**: Introduction - steps to build a useful model of input data - data collection, identifying the distribution with data, input models without data, models of arrival processes.	**CO1, CO2 CO3**
IV	**Reliability Management:** Reliability testing - Reliability growth monitoring - Non parametric Methods - Reliability and life cycle costs – Reliability allocation - Replacement model.	**CO1, CO5**
V	**Concept of risk-** objective and scope of risk assessment- probabilistic Risk- risk perception and acceptability- PRA management- preliminary hazard analysis- HAZOP and HAZAN, FMEA and FMECA analysis, Fault tree Analysis, Reliability-based optimum design, Strength-based reliability.	**CO1, CO4**

Learning Resources
Text Books:
1. Srinath L. S., “Reliability Engineering”, East-West Press Pvt. Ltd., ISBN 81-85336-39-3. 2. Bhadury B., Basu S. K., “Terotechnology-Reliability Engineering and maintenance”, Asian Books Private Limited, ISBN 81-86299-40-6. 3. Modarres, “Reliability and Risk analysis ", Mara Dekker Inc., 1993.
Reference Books:
1.John Davidson, “The Reliability of Mechanical system ", published by the 2.Institution of Mechanical Engineers, London, 1988. 3.Smith C.O." Introduction to Reliability in Design ", McGraw Hill, London, 1976. 4.Singiresu S. Rao ‘Reliability Engineering’ 1st Edition Pearson, 2014.
E- resources:
1. http://Life Data Analysis 2. http://nptel.ac.in/courses/10567/reliability 3. www.Reliability Growth Analysis.com 4. www.FMEA and FMECA Analysis.com