Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech.	Reliability Engineering	MEI 603	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
III	3	3-0-0	3 Hours

Unit - I

Introduction to Reliability Engineering: Definition of reliability; Types of failures; Definition and factors influencing system effectiveness; Various parameters of system effectiveness. **(05 Hours)**

Unit - II

Reliability Data Analysis: Definition of probability; Laws of probability; Conditional probability; Bayes theorem; Probability distributions: Exponential; Weibull; Normal and Gamma; Data collection; Recovery of data; Data analysis Procedures; Empirical reliability calculations; Goodness of fit tests; Survival graphs. **(09 Hours)**

Unit - III

Reliability Modeling: Types of system- Series; Parallel; Series - parallel; Stand by and complex; Development of logic diagram; Methods of reliability evaluation; cut set and tieset methods; Matrix methods event trees and fault trees methods; Reliability evaluation using probability distributions; Markov method; Frequency and duration method. **(09 Hours)**

Unit - IV

Reliability Testing: Failure terminated test; Time terminated test; Upper and lower MTBFs; Sequential testing; Reliability growth monitoring; Life testing-requirements; Methods; test planning; Data reporting system; Data reduction and analysis; Reliability test standards. **(08 Hours)**

Unit - V

Reliability Improvement: Methods of reliability improvement; Component redundancy; System redundancy; Types of redundancies-Series; Parallel; Series - parallel; Stand by and hybrid. **(07 Hours)**

Unit - VI

Reliability Replacement Decisions: Effect of maintenance; Analysis of downtime – Repair time distribution; System repair time; Maintainability prediction; Measures of maintainability; System availability; Replacement decisions. **(07 Hours)**

Recommended Books:

1. Reliability in Engineering and Design; K. C. Kapoor & L. R. Lamberson; John Wiley and Sons.
2. An introduction to Reliability and Maintainability Engineering; Charles E. Ebeling; Tata McGraw Hill.
3. Reliability Evaluation of Engineering Systems; Roy Billington and Ronald N. Allan; Springer.