Course code: Course Title	Course Structure			Pre-Requisite
SE306: Software Reliability	L	T	P	Software Engineering
	3	1	0	

Course Objective: To appreciate and understand scientific concepts of Software and Hardware Reliability, to apply Software Reliability Growth Models in Software Development and to emphasize the Application of Software Reliability Models.

S. NO	Course Outcomes (CO)
CO1	Remember and understand the reliability mathematics.
CO2	Understand software and hardware reliability concepts and terminologies.
CO3	Apply non homogeneous poisson process models to access software reliability
CO4	Analyze, compare, and evaluate software reliability growth models.
CO5	Analyze and apply methods to prepare test case and executing those test cases.

S.No.	Contents	Contact Hours
UNIT 1	**Introduction to System Reliability**: Review of Reliability Mathematics – Random Experiment, Probability distributions- Binomial, Poisson, Exponential, Weibull, and Generalized Exponential distributions; System Reliability -Reliability Block diagram — Repairable and Non-Repairable systems; Maintainability and Availability — MTBF — MTTF, MDT – MTTR; Designing for higher reliability — Redundancy— k out of n systems	8
UNIT 2	**System Reliability Concepts**: Software and hardware reliability; Basic Concepts – Errors, faults and Failures; Reliability Model classification – Operational Reliability, Testing Reliability; Introduction to Software Reliability Growth Models (SRGMs) - General Model Characteristic – Historical Development of models – Model Classification scheme –white box and black box models; Markovian models – Jelinski –Moranda model	9
UNIT 3	**Non-Homogenous Poisson Process Models:** NHPP models- Musa models- Basic Execution time, Logarithmic Poisson Execution time models- Goel – Okumoto model, Yamada delayed S-shaped model, Imperfect debugging models –Kapur- Garg model, Subburaj-Gopal model for the learning phenomenon, Subburaj-Gopap-Kapur versatile debugging model	9
UNIT 4	**Comparison of Software Reliability Models:** Bayesian models- Littlewood – Verall model; Discrete models; Efforts based models; Execution time, Testing time and Calendar Time modeling; Comparison Criteria – Goodness of fit - Predictive Validity of Models – short term and long term	8
UNIT 5	**Advanced Topics in Software Reliability:** Engineering "just right reliability"- Test case generation-operational profile; setting system failure intensity objectives; preparing, executing and guiding test; Release Time determination – criteria – cost, failure intensity, reliability.	8
	TOTAL	42

REFERENCES		
S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1.	John D. Musa, Anthony Iannino, Kazuhira Okumoto, "Software Reliability – Measurement, Prediction, Application, Series in Software Engineering and	1987

	Technology", McGraw Hill.	
2.	Michael Lyu, "Handbook of Software Reliability Engineering", IEEE Computer Society Press, ISBN: 0-07-039400-8.	**1996**
3.	John D. Musa, "Software Reliability Engineering", Tata McGraw Hill, 1999.	**1999**
4.	Patric D. T.O'Connor, "Practical Reliability Engineering", 4th Edition, John Wesley & sons, 2003.	**2003**
5.	M. Xie, "Software Reliability Modelling", World Scientific, Singapore, 1991.	**1991**