INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

REVISION OF AN ELECTIVE COURSE

Course Title	**Probabilistic Engineering Design**	Course Code	**ME5XXX**			
Dept./ Specialization	Mechanical Engineering	Structure (LTPC)	3	1	0	4
To be offered for	UG / PG	Status	Core ☐		Elective ■	
Faculty Proposing the course	Dr. Siva Prasad AVS	Type	New ☐		Modification ■	
Recommendation from the DAC		Date of DAC	01-06-2021			
External Expert(s)	Prof. S Narayanan, BoG Member, IIITDM Kancheepuram					
Pre-requisite		Submitted for approval	45th Senate			
Learning Objectives	To impart knowledge on making reliable decisions with the consideration of uncertainty associated with design variables/parameters and simulation models.					
Learning Outcomes	At the end of the course student will be able • To evaluate or assess the uncertainty associated with a particular design and improve the design. • To apply the probabilistic approach of prediction and estimation of a system response.					
Contents of the course *(With approximate break-up of hours for L/T/P)*	Elements of probability theory, Random variables, Discrete and continuous. Moments and characteristic functions, Functions of random variables, Some important random variables–Binomial, Poisson, Normal, Log Normal. (L12+T4) Reliability functions, Failure rate and hazard functions, Different failure time distributions–Exponential, Rayleigh, Weibull, Gamma etc. Mean Time to Failure (MTTF), Modelling of Geometry, Material Strength & Loads (L12+T4) Repair and maintainability, Repair time distribution, Mean Time Before Failure (MTBF), Combinational aspects of reliability, System reliability for series, parallel, series and parallel combinations, Standby redundancy. (L9+T3) Probabilistic design of mechanical components, Electrical and electronic systems, Factor of safety and reliability, Monte Carlo simulation, First order reliability methods (FORM) and Second order reliability methods (SORM), Mechanical properties of materials as random variables. (L9+T3)					
Text Book	1. K. C. Kapur and L. R. Lamberson, Reliability in Engineering Design, Wiley India Pvt Ltd., 2009. 2. D. C. Montgomery, Applied Probability and Statistics for Engineers, John Willey, 2006.					
Reference Books	1 J. N. Siddall, Probabilistic Engineering Design, CRC Press, 1983. 2 Dhillon, Engineering Maintainability – How to design for reliability and easy maintenance, Prentice Hall India, 2008. 3 C. E. Ebling, An Introduction to Reliability and Maintainability Engineering, Tata-McGraw Hill, 2000					