COURSE TITLE	**TE142357: Random Processes in Telematics** Credits: 3 Semester: I
LEARNING OBJECTIVES	To study various representations and characteristics of random variables and processes, as well as their applications in communication systems and signal processing.
COMPETENCY	The students will understand and be able to apply following concepts: • Axioms of and operations on probability • Conditional and independent probability • Random variables, vectors and processes, and their • Random signal processing and its characterisation in time and frequency domains]
SUBJECTS	Sets, field and events. Sample sets. Axiomatic definition of probability. Joint, conditional and total probabilities. Independence; Bayes theorem; Combinatorial, Bernoulli, binomial and multinomial experiments. Random variable definition; distribution function and probability density function. Conditional and joint density and distribution function. Transformations of random variables. Expectations of random variables; conditional expectation; moments and moment generating functions; uncorrelated random variables; jointly Gaussian random variables; Chebysev and Chernoff inequality; characteristics functions; mean and variance estimators. Expectation vector and covariance matrix. Covariance matrix diagonalization. Random sequences. Linear discrete-time systems; Wide sense stationary sequence. Power spectral density and correlation. Markov random sequence. ARMA model. Definition and examples of random processes: Poisson, Wiener, Markov. Linear time-invariant system with random input. White noise. Orthogonalization and linear estimation. Kalman and Wiener filters.
MAIN REFERENCES	• Henry Stark & John W. Woods, Probability and Random Processes with Applications to Signal Processing, 3rd ed., Prentice Hall, 2002.
OPTIONAL REFERENCES	• Robert M. Gray & Lee D. Davisson, An Introduction to Statistical Signal Processing, Cambridge University Press, 2008. • Todd K. Moon & Wynn C. Stirling, Mathematical Methods and Algorithms for Signal Processing, Prentice Hall, 2000. • IEEE Transaction on Signal Processing
PREREQUISITE	-