MA1354	PROBABILITY AND BAYESIAN INFERENCE	L	T	P	C
	AI & ML	4	0	0	4

Objectives

- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the basic concepts of random processes which are widely used in engineering applications.
- To acquaint the knowledge of testing of hypothesis for small and large samples, which plays an important role in real life problems.
- To introduce concept of Bayesian inference.

UNIT - I PROBABILITY AND RANDOM VARIABLES 12

Probability – The axioms of probability – Conditional probability – Baye's theorem - Discrete andcontinuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions. **CO1**

UNIT - II TWO - DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linearregression – Central limit theorem (for independent and identically distributed random variables). **CO2**

UNIT - III RANDOM PROCESSES 12

Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions. **CO3**

UNIT - IV TESTING OF HYPOTHESIS 12

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) – Goodness of fit. **CO4**

UNIT - V BAYESIAN INFERENCE 12

Bayesian Inference for Discrete random variables - Bayesian Inference for Continous random variables – Bayesian Inference for Binomial proportions - Comparing Bayesian and Frequentist inferences for proportion. **CO5**

TOTAL : 60 PERIODS

TEXT BOOKS:

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics forEngineers", Pearson Education, Asia, 9th Edition, 2017.
2. Ibe, O.C., —Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd Indian Reprint, 2014.
3. Bolstad, W. M., Curran, J. M. Introduction to Bayesian Statistics. : Wiley. (Unit V Chapter 6, 7, 8 and 9) , Wiley , 2016

REFERENCE BOOKS:

1. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2017.
2. Yates, R.D. and Goodman. D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2014.
3. Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2017.
4. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 4thEdition,Elsevier, 2009.
5. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems ofProbability and Statistics", Tata McGraw Hill Edition, 2008.

COURSE OUTCOMES

Upon completion of the course, students will be able to

CO1	Get exposure to random variables and well-founded knowledge of standard distributions which can describe real life phenomena.
CO2	Get ideas to handle situations involving more than one random variable and functions of random variables.
CO3	Gain an understanding and characterizes phenomena which evolve with respect to time in a probabilistic manner and modelling the real life phenomena.
CO4	Gain the knowledge on Large Samples and Samples. These concepts are very useful in biological, economical and social experiments and all kinds of generalizations based on information about a smaller sample and larger samples. Apply the appropriate test in the problems related with sampling.
CO5	Do Bayesian Inference for discrete and continuous random variables

MAPPING OF COs WITH POs AND PSOs															
COs	**PROGRAM OUTCOMES (POs)**												**PROGRAM SPECIFIC OUCOMES**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	2	1	0	0	0	0	1	1	3	2	1
CO2	3	3	2	2	2	1	0	0	0	0	1	1	3	2	1
CO3	3	2	2	1	1	1	0	0	0	0	1	1	3	2	1
CO4	3	3	2	3	3	2	1	0	0	0	2	2	3	2	1
CO5	3	3	2	3	2	2	1	0	0	0	1	2	2	2	1