	L ESSON PLAN	**LP-EC-181403**
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	Unit: I **Branch: ECE** **Semester : IV**	

Unit syllabus:

UNIT I RANDOM VARIABLES

Discrete and continuous random variables – Moments - Moment generating functions and their properties. Binomial, Poisson ,Geometric, Uniform, Exponential, Gamma and normal distributions – Function of Random Variable.

Objective: To enable the students to have a fundamental knowledge of the basic probability concepts and to have a well-founded knowledge of standard distributions which can describe real life phenomena

Session No	Topics to be covered	Time	Ref	Teaching Method
1	Introduction, Random variables, discrete and continuous random variables, cumulative distribution function	50	1	Black Board and Chalk
2	Probability mass/density function Moments, moment generating function, probability generating function.	50		
3	Moments, moment generating function, probability generating function	50		
4,5	Examples of discrete random variables- Binomial Poisson variates . Poisson Distribution	100		
6,7	Poisson , Geometric distributions.	100		
8,9	Continuous distributions - Uniform, Exponential distributions.	100		
10	Gamma distribution, Normal distribution	50		
11	Normal Distribution	50		
12	Function of Random Variable – discrete, continuous	50		
13	Function of Random Variable, Revision	50		
14	CAT 1	40		

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Unit syllabus:

UNIT II TWO DIMENSIONAL RANDOM VARIBLES

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem (for iid random variables)

Objective: To acquire skills in handling situations involving more than one random variable and functions of random variables

Session No	Topics to be covered	Time	Ref	Teaching Method
15	Two- dimensional random variables, Joint distribution functions, joint density functions.	50		
16	Marginal distribution/density functions, conditional density functions, independent random variables	50		
17	Correlation, covariance, Spearman's rank correlation.	100		
18	Regression curves	50		
19	Regression curves	50	1	Black Board and Chalk
20	Regression lines, Rank correlation	50		
21	Regression lines, Rank correlation	50		
22	Tranformation of random variables	50		
23	Tranformation of random variables	50		
24	Central limit theorem	50		
25	CAT 2	40		

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Unit syllabus:

UNIT III CLASSIFICATION OF RANDOM PROCESSES

Definition and examples - first order, second order, strictly stationary, wide-sense stationary and ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process – Random telegraph process.

Objective:

Understand and characterize phenomena which evolve with respect to time in probabilistic manner.

Session No	Topics to be covered	Time	Ref	Teaching Method
26	Random processes- Introduction, classification.	50	2	Black Board and Chalk
27	Stationary processes- first order, second order, autocorrelation function, autocovariance function , WSS	50		
28,29	WSS processes, Problems, Ergodic Processes	100		
30	Markov process, Bernoulli process	50		
31	Binomial process	50		
32	Poisson process	50		
33	Poisson process	50		
34	Normal process	50		
35	Normal process	50		
36	Sine-wave process	50		
37	Random Telegraph process	50		
38	CAT 3	40		

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Unit syllabus:

UNIT IV CORRELATION AND SPECTRAL DENSITIES

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function **.**

Objective:

To understand the relationship within and between random processes

Session No	Topics to be covered	Time	Ref	Teaching Method
39	Properties of Auto-correlation, auto-covariance functions	50		
40	Cross correlation function –properties.	50		
46	Power spectral density, cross Power spectral density, properties	50		Black Board and Chalk
47	Problems	50		
48	Wiener –Khintchine theorem	50	2	
49	Problems	50		
50	Relationship between cross power spectrum and cross correlation function	50		
51	Problems	50		
52	Revision	50		
53	CAT 4	40		

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Unit syllabus:

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS

Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – white noise.

Objective:

To be able to analyze the response of random inputs to linear time invariant systems.

Session No	Topics to be covered	Time	Ref	Teaching Method
54	Linear systems with random inputs - LTI systems- System transfer function	50		
55	Causal system, stable system, Autocorrelation and cross correlation functions of input and output	50		
56	Autocorrelation and cross correlation functions of input and output	50		
57	Problems	50		
58	Problems	50	2	Black Board and Chalk
59	White Noise	50		
60	Problems, Revision	50		
61	Cat 5	40		

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Course Delivery Plan:

Week	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15	
	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
Units									CAT I				CAT II				CAT III										CAT IV			CAT V

TEXT BOOKS

1. Oliver C. Ibe, “Fundamentals of Applied probability and Random processes”, Elsevier, First Indian Reprint (2007) (For units 1 and 2)

2. Peebles Jr. P.Z., “Probability Random Variables and Random Signal Principles”, Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002. (For units 3, 4 and 5).

REFERENCES

1. Miller,S.L and Childers, S.L, “Probability and Random Processes with applications to Signal Processing and Communications”, Elsevier Inc., First Indian Reprint 2007.

2. H. Stark and J.W. Woods, “Probability and Random Processes with Applications to Signal Processing”, Pearson Education (Asia), 3rd Edition, 2002.

3. Hwei Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes”, Tata McGraw-Hill edition, New Delhi, 2004.

4. Leon-Garcia,A, “Probability and Random Processes for Electrical Engineering”, Pearson Education Asia, Second Edition, 2007.

5. Yates and D.J. Goodman, “Probability and Stochastic Processes”, John Wiley and Sons, Second edition, 2005.

	Prepared by	Approved by
Signature		
Name		
Designation		
Date		