



DEPARTMENT OF APPLIED MATHEMATICS			LP: MA16453
B.E/B.Tech	: Common to CS and IT	Regulation:2016	Rev. No: 00
Sub. Code / Sub. Name	: MA16453 / PROBABILITY AND QUEUING THEORY		Date: 11.12.2017
Unit I	: Random Variables		

Unit Syllabus: Random Variables

Discrete and continuous random variables - Moments - Moment generating functions , Binomial, Poisson ,Geometric, Uniform, Exponential, Gamma, and Normal distributions.

Objective: To introduce the concept of random variables and deal with various probability distributions.

Session No.	Topics to be covered	Ref	Teaching Aids
1	Introduction to unit I. Random variables.	T-1,Ch-2,pg.59-61	BB/PPT
2	Probability mass function, probability density function.	T-1,Ch-2,pg.62-75	BB/PPT
3	Moments	T-1,Ch-3,pg.85-101	BB/PPT
4	MGF and problems based on MGF	T-1,Ch-3,pg.85-101	BB/PPT
5	Binomial Distribution.	T-1,Ch-4,pg.111-115	BB/PPT
6	Poisson Distribution.	T-1,Ch-4,pg.130-132	BB/PPT
7	Geometric Distribution.	T-1,Ch-4,pg.116-120	BB/PPT
8	Uniform Distribution.	T-1,Ch-4,pg.141-143	BB/PPT
9	Exponential Distribution.	T-1,Ch-4,pg.133-136	BB/PPT
10	Gamma Distribution.	R-3,Ch-3,pg.126-128	BB/PPT
11	Normal Distribution.	T-1,Ch-4,pg.144-147	BB/PPT
12	Summarizing the unit.	T-1,Ch-4,pg.111-153	BB/PPT
Content beyond syllabus covered (if any):Application of One dimensional random variable in real life problem			

* Session duration: 50 minutes



Sub. Code / Sub. Name: MA16453 PROBABILITY AND QUEUEING THEORY

Unit II Two dimensional random variables

Unit syllabus: Two dimensional random variables

Joint Distributions - Marginal and conditional distributions – Covariance - Correlation and Linear regression - Transformation of random variables.

Objective: To introduce the concept of two dimensional random variable, correlation and linear regression.

Session No	Topics to be covered	Ref	Teaching Aids
13	Introduction - Unit Syllabus - Joint distributions.	T-1,Ch-5,pg.167-173	BB/PPT
14	Marginal distributions.	T-1,Ch-5,pg.167-173	BB/PPT
15	Conditional distributions.	T-1,Ch-5,pg.178-182	BB/PPT
16	Problems based on Marginal and Conditional distributions	T-1,Ch-5,pg.173-175	BB/PPT
17	CAT I		
18	Covariance.	T-1,Ch5,pg.184-186	BB/PPT
19	Properties, Problems on Correlation .	T-1,Ch-5,pg.184-186	BB/PPT
20	Linear Regression – properties.	T-1,Ch-11,pg.418-422	BB/PPT
21	Problems on regression.	T-1,Ch-11,pg.418-422	BB/PPT
22	Transformation of random variables	T-1,Ch-6,pg.197-215	BB/PPT
23	Problems on Transformation of random variables	T-1,Ch-6,pg.197-215	BB/PPT
24	Summarization of Unit-II.	T-1,Ch-5,pg.167-190	BB/PPT

Content beyond syllabus covered (if any): Application of Correlation and Regression in real life problem

* Session duration: 50 mins

**Sub. Code / Sub. Name: MA16453 PROBABILITY AND QUEUEING THEORY****Unit III : Random Processes****Unit syllabus: Random Processes**

Classification - Stationary process - Markov process - Poisson process - Discrete parameter Markov chain - Chapman Kolmogorov equation- Limiting distributions-

Objective:

To understand and characterize phenomena which evolve with respect to time in a probabilistic manner.

Session No	Topics to be covered	Ref	Teaching Aids
25	Random processes- Introduction, classification.	T-1,Ch-8,pg.267-273	BB/PPT
26	Stationary process – Wide Sense Stationary	T-1,Ch-8,pg.275-282	BB/PPT
27	Strict Sense Stationary	T-1,Ch-8,pg.275-282	BB/PPT
28	Markov Process	T-1,Ch-10,pg.358-359 R-3,Ch-7,pg.309-316	BB/PPT
29	Markov Chain	T-1,Ch-10,pg.359-376 R-3,Ch-7,pg.309-316	BB/PPT
30	Problems based on Markov Process.	T-1,Ch-10,pg.359-376 R-3,Ch-7,pg.309-316	BB/PPT
31	Transition probabilities	T-1,Ch-10,pg.359-376 R-3,Ch-7,pg.311-317	BB/PPT
32	Limiting distributions	T-1,Ch-10,pg.359-376 R-3,Ch-7,pg.317-324	BB/PPT
33	Poisson Process - Properties	T-1,Ch-10,pg.342-356 R-3,Ch-6,pg.283-291	BB/PPT
34	Poisson Process - Problems	T-1,Ch-10,pg.342-356 R-3,Ch-6,pg.283-291	BB/PPT
35	Summarization of unit.	T-1,Ch-10,pg.378	BB/PPT
36	CAT II		

Content beyond syllabus covered (if any):Application of Random processes in signal processing

* Session duration: 50 mins

**Sub. Code / Sub. Name: MA16453 PROBABILITY AND QUEUEING THEORY****Unit IV : Queuing Models****Unit syllabus: Queuing Models**

Markovian Queues – Birth and Death Processes- Single and multiple server queuing models-Little's Formula - Queues with finite waiting rooms- Finite source models

Objective:

To be exposed to basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

Session No	Topics to be covered	Ref	Teaching Aids
37	Queueing system – introduction	T-2,Ch-1,pg.1-7	BB/PPT
38	Markovian Models.	T-2,Ch-1,pg.1-45	BB/PPT
39	Birth and Death Process.	T-2,Ch-1,pg.1-45	BB/PPT
40	M/M/1, Infinite Capacity	T-2,Ch-2,pg.53-68	BB/PPT
41	M/M/1, Infinite Capacity	T-2,Ch-2,pg.53-68	BB/PPT
42	M/M/1, Finite Capacity	T-2,Ch-2,pg.53-68	BB/PPT
43	M/M/1, Finite Capacity	T-2,Ch-2,pg.53-68	BB/PPT
44	M/M/c, Infinite Capacity	T-2,Ch-2,pg.69-73	BB/PPT
45	M/M/c, Infinite Capacity	T-2,Ch-2,pg.69-73	BB/PPT
46	M/M/c, Finite Capacity	T-2,Ch-2,pg.69-73	BB/PPT
47	Little's Formula	T-2,Ch-2,pg.53-115	BB/PPT
48	Finite source models, Summarization of unit.	T-2,Ch-5,pg.209-260	BB/PPT
Content beyond syllabus covered (if any):Application of queuing models in real life problem			

* Session duration: 50 mins

**Sub. Code / Sub. Name: MA16453 PROBABILITY AND QUEUEING THEORY****Unit V : Non-Markovian Queues And Queue Networks****Unit Syllabus: Non-Markovian Queues And Queue Networks**

M/G/1 queue- Pollaczek- Khintchine formula- M/D/1 and M/EK/1 as a special cases - series queues- Open Jackson Networks.

Objective: Detail study of non-Markovian queues

Session No.	Topics to be covered	Ref	Teaching Aids
49	Introduction to unit V	T-2,Ch-5,pg.209-260	BB/PPT
50	M/G/1 queue	T-2,Ch-5,pg.209-260 R-3,Ch-7,pg.336-343	BB/PPT
51	Pollaczek- Khintchine formula	T-2,Ch-5,pg.211-214	BB/PPT
52	Problems on M/G/1 queue	T-2,Ch-5,pg.213-214 R-3,Ch-7,pg.336-343	BB/PPT
53	M/D/1 and M/EK/1 as special cases	T-2,Ch-5,pg.209-260	BB/PPT
54	M/D/1 and M/EK/1 as special cases	T-2,Ch-5,pg.209-260	BB/PPT
55	Series queues	T-2,Ch-4,pg.167-173 R-3,Ch-9,pg.411-415	BB/PPT
56	Series queues	T-2,Ch-4,pg.167-173 R-3,Ch-9,pg.411-415	BB/PPT
57	Open Jackson Networks	T-2,Ch-4,pg.174-182 R-3,Ch-9,pg.416-422	BB/PPT
58	Open Jackson Networks	T-2,Ch-4,pg.174-182 R-3,Ch-9,pg.416-422	BB/PPT
59	Summarization of unit.	T-2,Ch-4,5,pg.167-260	BB/PPT
60	CAT III		
Content beyond syllabus covered (if any): Application of queuing models in real life problem			

* Session duration: 50 mins



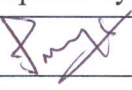
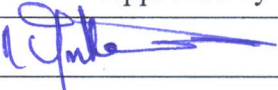
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TEXT BOOKS:

- 1.O.C. Ibe, "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007.
2. D. Gross and C.M. Harris, "Fundamentals of Queueing Theory", Wiley Student edition, 2004.

REFERENCES:

1. Robertazzi, "Computer Networks and Systems: Queueing Theory and performance evaluation", Springer, 3rd Edition, 2006.
2. H.A. Taha, "Operations Research", Pearson Education, Asia, 8th edition, 2007.
3. Veerarajan. T, "Probability, statistics and random processes", McGraw Hill Publishers, 3rd edition, 2011.
4. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004
5. Yates. R.D. and Goodman. D. J., "Probability and Stochastic Processes", Wiley India Pvt. Ltd. Bangalore, 2nd Edition, 2012.

	Prepared by	Approved by
Signature		
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Designation	Assistant Professor	Professor & Head
Date	11.12.2017	11.12.2017

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD