15MA207	PROBABILITY AND QUEUEING THEORY	L	T	P	C
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Co-requisite:	NOT APPLICABALE				
Prerequisite:	15MA102				
Data Book / Codes/Standards	STATISTICAL TABLES				
Course Category	B CORE	MATHEMATICS			
Course designed by	Department of Mathematics				
Approval	-- Academic Council Meeting -- , 2016				

PURPOSE	To acquire analytical ability in solving mathematical problems as applied to the respective branches of engineering		
INSTRUCTIONAL OBJECTIVES		**STUDENT OUTCOMES**	
At the end of the course, student will be able to			
1.	Be through with probability concepts	a	e
2.	To acquire knowledge on Probability Distributions	a	e
3.	Get exposed to the testing of hypothesis using distributions	a	e
4.	Gain strong knowledge inn principles of Queueing theory	a	e
5.	Get exposed to Discrete time Markov chain	a	e

Session	Description of Topic	Contact hours	C-D-I-O	IOs	Reference
	UNIT I: RANDOM VARIABLES	**14**			
1.	Review of probability concepts, Types of Events, Axioms, Conditional probability, Multiplication theorem, Applications.	2	C,I	1	1-5
2.	Discrete and continuous Random Variables – Discrete case, Probability Mass function, Cumulative distribution function, Applications	2	C,I	1	1-5
3.	Characteristics of random variables – Continuous case, Probability density function, Cumulative distribution function, Applications	2	C,I	1	1-5
4.	Expectation, Variance.	2	C,I	1	1-5
5.	Higher Order Moments	2	C,I	1	1-5
6.	Moment Generating Function, Functions of Random Variable (One dimensional only)	2	C,I	1	1-5
7.	Chebychev's Inequality – (Statement only). Applications of Chebychev's Inequality	2	C,I	1	1-5
	UNIT II: THEORETICAL DISTRIBUTIONS	**12**			
8.	Discrete Probability distribution: Binomial distribution – MGF, Mean, Variance, Applications of Binomial distribution, Fitting a Binomial distribution	2	C,I	2	1-5
9.	Poisson distribution – MGF, Mean, Variance, Applications of Poisson distribution, Fitting a Poisson distribution	2	C,I	2	1-5

10.	Geometric distribution – MGF, Mean, Variance, Memoryless Property , Applications of Geometric distribution	2	C,I	2	1-5
11.	Continuous Probability Distributions: Uniform distribution – MGF, Mean, Variance & Applications	1	C,I	2	1-5
12.	Exponential Distribution - MGF, Mean, Variance, Memoryless Property Applications of Exponential distribution	2	C,I	2	1-5
13.	Normal distribution – Mean, Variance	1	C,I	2	1-5
14.	Standard Normal distribution and Applications of Normal distribution	2	C,I	2	1-5
	UNIT-III - TESTING OF HYPOTHESIS	**14**			
15.	Introduction to Sampling Distributions, Population and Sample, Null Hypothesis and Alternative Hypothesis, Single and Two Tailed Test.	2	C,I	3	1-5
16.	Testing of Hypothesis, Level of Significance, Critical Region, Procedure for Testing of Hypothesis	1	C,I	3	1-5
17.	Large Sample Test- Test For Single Proportion, Two Sample Proportions	2	C,I	3	1-5
18.	Large Sample Test- Test For Single Mean, Two Sample Means	2	C,I	3	1-5
19.	Small Sample Tests – 't' Test For a Single Mean	1	C,I	3	1-5
20.	't' Test For The Difference Of Means, Paired 't' Test	2	C,I	3	1-5
21.	F Test – Test of Significance of The Difference Between Two Population Variances	2	C,I	3	1-5
22.	Chi Square Test For Goodness of Fit, Independence of Attributes	2	C,I	3	1-5
	UNIT-IV : QUEUEING THEORY	**10**			
23.	Introduction to Markovian queueing models	2	C,I	4	1-5
24.	Single Server Model with Infinite system capacity, Characteristics of the Model (M/M/1) : (∞/FIFO)	2	C,I	4	1-5
25.	Problems on Model (M/M/1) : (∞/FIFO)	2	C,I	4	1-5
26.	Single Server Model with Finite System Capacity, Characteristics of the Model (M/M/1) : (K/FIFO)	2	C,I	4	1-5
27.	Problems on Model (M/M/1) : (K/FIFO)	2	C,I	4	1-5
	UNIT-V : MARKOV CHAINS	**10**			
28.	Introduction to Stochastic process, Markov process, Markov chain one step & n-step Transition Probability.	2	C,I	5	1-5

29.	TPM and Applications	1	C,I	5	1-5
30.	Chapman Kolmogorov theorem (Statement only), Applications on Chapman Kolmogorov theorem	1	C,I	5	1-5
31.	Transition probability	2	C,I	5	1-5
32.	Transition probability - Applications	1	C,I	5	1-5
33.	Classification of states of a Markov chain	2	C,I	5	1-5
34.	Classification of states of a Markov chain – Applications	1	C,I	5	1-5
	Total contact hours	60			

LEARNING RESOURCES	
Sl. No.	**TEXT BOOKS**
1.	Veerarajan T., Probability, Statistics and Random Processes, Tata McGraw Hill,1st Reprint 2004.
2.	S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 9th extensively revised edition, Sultan Chand & Sons, 1999.
	REFERENCE BOOKS/OTHER READING MATERIAL
3.	Trivedi K S, " Probability and Statistics with reliability, Queueing and Computer Science Applications", Prentice Hall of India, New Delhi, 1984
4.	Gross.D and Harris.C.M. "Fundamentals of Queuing theory", John Wiley and Sons, 1985.
5.	Allen.A.O., "Probability Statistics and Queuing theory", Academic Press, 1981.

Course nature		**Theory**					
Assessment Method (Weightage 100%)							
In-semester	**Assessment tool**	Cycle test I	Cycle test II	Cycle Test III	Surprise Test	Quiz	**Total**
	Weightage	**10%**	**15%**	**15%**	**5%**	**5%**	**50%**
					End semester examination Weightage :		**50%**