LNMIIT, Jaipur Department of Computer Science & Engineering	LNMIIT The LNM Institute of Information Technology

Programme: B. Tech. (CSE)	Course Title: Mathematical Structures for Engineers			Course Code: CSE 6011
Type of Course: Program Core	Prerequisites: None			Total Contact Hours: 40
Year/Semester: I/Odd	Lecture Hrs/Week: 3	Tutorial Hrs/Week: 0	Practical Hrs/Week: 0	Credits: 3

Learning Objective:

This course is designed with an objective to provide the essential mathematical knowledge required for a master student. The content of the course is designed keeping in mind the heterogeneous audience with background from electronics and communication engineering, computer science and engineering disciplines. At the conclusion of the course, students are expected to have acquired a good level of Mathematics, which will enable them to see its relevance in their own domain of knowledge.

Course outcomes (COs):

On completion of this course, the students will have the ability to:		Bloom's Level
CO-1	To explain the basic concept of mathematics and its usefulness for solving engineering problems.	1, 2, 3
CO-2	To apply the mathematical knowledge for solving some engineering problems.	4
CO-3	To analyze and implement various concepts of matrix algebra.	3, 4
CO-4	To explain the role played by the mathematical structures to build and construct algorithmic solution to the computational problems.	2
CO-5	To write a term paper on mathematical structures.	1, 4

Course Topics	Lecture Hours	
UNIT – I (Set & Graph Theory Introduction)		6
1.1 Review Sets, Relations and Functions	1	
1.2 Basic Graph Theory Concepts	3	
1.3 Networks flow problem	**2**	
UNIT – II (Probability and Statistics)		14
2.1 Introduction, Axioms of Probability & its properties	**1**	

2.2 Joint Probability, Conditional Probability, Bayes Theorem, Independence of Events, Total Probability theorem.	**2**	
2.3 **Random Variables:** Distribution Functions of Discrete Variables: Bernoulli Distribution Binomial Distribution Geometric Distribution, Poisson distribution, Distribution Functions of Continuous Variables: Uniform, Exponential, Normal (Gaussian), Gamma Distribution. Mean, Variance of Random Variables & higher order moments, Expectation of function of Random variables, Characteristic Functions, Chebychev Inequality.	**6**	
2.4 **Multiple Random Variables:** Bivariate Discrete Random Variables. Bivariate Continuous Random Variables. Conditional Distributions. Independence of Random Variables.	**2**	
2.5 **Product Moments of Bivariate Random Variables:** Covariance of Bivariate Random Variables, Independence of Random Variables, Variance of the Linear Combination of Random Variables, Correlation and Independence.	**2**	
2.6 **Goodness of Fits Tests:** Chi-Squared test, Student T Test, F Test.	**1**	
UNIT – III		**11**
3.1 Elements of Group, Ring and Field Theory	**2**	
3.2 Vector Space: Linear Dependence and Independence , Span	**3**	
3.3 Basis, Dimension, Change of Basis	**3**	
3.4 Finite Dimensional Vector Space, Linear transformations, Matrix, Determinant	**3**	
UNIT-IV		**9**
4.1 Eigen Values, Eigen Vectors, Diagonalization, Quadratic forms, JC forms, Singular value & their applications	**6**	
4.2 Inner Product Spaces, Gram-Schmidt Process, Least Square approximation.	**3**	

Textbook References: IEEE Format

Text Books:

1. **C. L. Liu, "Elements of Discrete Mathematics", 4th Ed, McGraw Hill Publication, 2012.**
2. **J.A. Bondy and U.S.R. Murty , "Graph Theory with Applications", North-Holland, 2006.**
3. **A. Papoulis & S. U. Pillai, "Probability, Random Variable Variables & Stochastic Processes", 4th Ed, McGraw Hill Publication, 2016.**

Reference Books:

1. **I.N. Herstein, "Topics in Algebra" 2nd Ed., Wiley, 2006.**
2. **G. Strang. "Introduction to Linear Algebra". Wellsley-Cambrige Press, 2003.**
3. **S. Kumaresan. Linear Algebra: A Geometric Approach. Prentice Hall India, 2008.**

4. **C.D. Cantrell. Modern Mathematical Methods for Physicists and Engineers. Cambridge University Press, 2000.**

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):
Some books can be added for the study of Linear Algebra

Evaluation Method	
Item	**Weightage (%)**
Quiz-1	30
Quiz-2	
Class Participation	
Midterm	25
Endterm	45

*Please note, as per the existing institute's attendance policy the student should have a minimum of 75% attendance. Students who fail to attend a minimum of 75% lectures will be debarred from the End Term/Final/Comprehensive examination.

CO and PO Correlation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1						2	1		3	3	1	
CO2	3	3	2						2	1		3	3	1	
CO3	3	3	1						2	1		3	3	1	
CO4	3	2	1						2	1		3	3	1	
CO5	3	3	1						2	1		3	3	1	
CO6	3	3	3	2					2	1		3	3	2	2

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Updated By:

Approved By: