with effect from :2020-21 (R-20)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

(Accredited by NAAC with A^{++} Grade)

9-5-81, Ibrahimbagh, Hyderbad-500031, Telangana State

DEPARTMENT OF MATHEMATICS

ADVANCED LINEAR ALGEBRA

(OPEN ELECTIVE)

for B.E., IV- Sem.,

(Common to all branches)

Instruction : 3 Hours per week	**Sem. End Exam Marks : 60**	**Subject Reference Code : U20OE410MA**
Credits : 3	**Sessional Marks : 40**	**Duration of Semester End Exam : 3 Hrs**

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	***At the end of the course students will be able to:***
1. ***Study*** *the concept of Vector Spaces, Subspaces, Linear Span, Linear Dependence and Independence of vectors.*	1. ***Solve the*** *problems on Vector Spaces and Linear Dependence and Independence of vectors.*
2. ***Understand*** *the meaning of Basis and Dimension of a vector Space and Co-ordinates.*	2. ***Determine*** *the Basis and Dimension of a Vector Space and find the Co-ordinates.*
3. ***Understand*** *the meaning of Linear transformation, properties.*	3. ***Determine*** *Linear Transformation, Range and Kernel and Matrix of Linear Transformation.*
4. ***Understand*** *Range and Kernel, Rank-Nullity and Matrix of Linear Transformation.*	4. ***Determine*** *Range and Kernel, Rank-Nullity and Matrix of Linear Transformation.*
5. ***Understand*** *Inner Product Spaces, Orthonormal sets, Gram-Schmidt's Orothogonalization process and its applications :Least squares,QR decomposition*	5. ***Determine*** *distance, orthogonal, orthonormal sets and construct orthonormal basis based on Gram-Schmidt's Orothogonalization process.Least Squares approximations-QR decomposition and its applications*

UNIT –I

Vector Spaces -I (8 Hours)

Internal Composition - External Composition -Definition of Vector Space - Vector Subspaces – Linear sum of two Subspaces – Linear Combination of Vectors – Linear Span of a set - Linear Dependence and Independence of vectors.

UNIT –II

Vector Spaces – II (8 Hours)

Basis of a Vector Space – Finite Dimensional Space – Coordinates – Dimension of a Vector Space – Dimension of a Subspace-Isomorphism.

UNIT-III

Linear Transformation -I (8 Hours):

Definition of Linear Transformation- Properties of Linear Transformations – Sum of Linear Transformations – Algebra of Linear Operators

UNIT-IV

Linear Transformation -II (6 Hours)

Range and kernel of a linear map – Dimension of Range and Kernel - Rank and nullity –- Rank nullity theorem (without proof)- Matrix of Linear Transformation.

UNIT-V

Inner Product Spaces (8 classes)

Definition of Inner Product Space-Norm or Length of a vector -Triangle inquality (with proof)– Normed vector space- Distance – orthogonal complement – Orthogonal and Orthonormal sets – Gram-Schmidt's Orthogonalization process. Applications: Least Squares Approximations-QR decomposition and its applications.

Text Books:

1. Introduction to linear algebra with applications, Jim DeFranza, Daniel Gagliardi, Tata McGraw-Hill
2. An introduction to Linear Algebra, V.P Mainra, J.L Arora, Affiliated to East-West Press Pvt Ltd

Reference Books:

1. Elementary Linear algebra, Anton and Rorres, Wiley India Edition
2. Advanced Engineering Mathematics, Erwin Kreysing, Wiley Publication
3. Elementary Linear algebra, ron Larson, Cengage Learning

Online Resources :

1. **http://tutorial.math.lamar.edu/Classes/DE/DE.aspx**
2. **http://mathworld.wolfram.com/topics**
3. **http://www.nptel.ac.in/course.php**

5/3/21