**Guidelines**

**B.Sc. (H) Computer Science**

**DSC-03 (Mathematics for Computing)**

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Topic** | **Reference** |  |
| **Table of Content** | **Book** |
| **1** | **Unit 1-** Introduction to Matrix Algebra: Echelon form of a Matrix,  Rank of a Matrix, Determinant and  Inverse of a matrix, Solution of System of Homogeneous & Non-Homogeneous Equations: Gauss elimination and Gauss Jordan Method. | [7.1](file:///C:\SSCBS\SEMESTER%201\MATHEMATICS%20FOR%20COMPUTING\7.1%5b2%5d.pdf) | [2] |
| [7.3](7.3%207.4%20%5b2%5d.pdf) |
| [7.4 Pg.282-285](7.3%207.4%20%5b2%5d.pdf) |
| [7.5](7.5%20%5b2%5d.pdf) |
| [7.7 Pg 293-295](7.7%20%5b2%5d.pdf) |
| 7.8 Pg 301-304 |
| **2** | **Unit 2 -** Vector Space and Linear Transformation: Vector Space, Subspaces, Linear Combinations, Linear Span, Convex Sets (Follow any Book) ,  Linear Independence/Dependence, Basis & Dimension, Linear transformation on finite dimensional vector spaces, Inner Product Space, Schwarz Inequality, Orthonormal Basis,  Gram-Schmidt Orthogonalization Process | 4.1 – 4.5 (Except Page no.  208 -212) | [3] |
| 5.1 – 5.4 |
| 7.5 |
| **3** | **Unit 3 -** EigenValue and EigenVector:  Characteristic Polynomial, Cayley Hamilton Theorem (Only in numericals), Eigen Value And eigen vector of a matrix, eigenspaces, Diagonalization, Positive Definite  Matrices, Applications to Markov Matrices | 6.1 Introduction to eigen value ( \*Refer 4.2 for applications) | [1] |
| 6.2 Diagonalization |
| 6.4 Symmetric Matrices |
| Cayley Hamilton Theorem Page no. 384 | [3] |
| 6.5 Positive Definite  Matrices | [1] |
| 8.3 Applications of Markov  Matrix | [1] |
| **4** | **Unit 4 -** Vector Calculus: Vector Algebra,Laws of Vector Algebra, Dot  Product, Cross Product,Vector and  Scalar Fields, Ordinary Derivative of  Vectors, Space Curves, Partial  Derivatives, Del Operator, Gradient of a Scalar Field, Directional Derivative, Gradient of Matrices, Divergence of a Vector Field, Laplacian Operator, Curl of a Vector Field. | 9.1 Vectors in 2-Space and  3-Space | [2] |
| 9.2 Inner Product (Dot  Product) |
| 9.3 Vector Product (Cross  Product) |
| 9.4 Vector and Scalar Functions and Their Fields.  Vector Calculus:  Derivatives |
| 9.7 Gradient of a Scalar  Field. Directional Derivative |
| 9.8 Divergence of a Vector  Field |
| 9.9 Curl of a Vector Field |

**Reference:**

1. Strang Gilbert, “Introduction to Linear Algebra”, 5th Edition, Wellesley-Cambridge Press, 2021.
2. Kreyszig Erwin, “Advanced Engineering Mathematics”, 10th Edition, Wiley, 2015.
3. Stephen Andrilli and David Hecker, “Elementary Linear Algebra”, Fourth Edition, Academic Press, 2010, ISBN: 978-0-12-374751-8

\* Deisenroth, Marc Peter, Faisal A. Aldo and Ong Chengsoonm “Mathematics for Machine Learning, 1st Edition, Cambridge University Press, 2020.