

SAURASHTRA UNIVERSITY RAJKOT

Syllabus of B.Sc. Semester-4 According to Choice Based Credit System from June - 2011

(New Syllabus Effective from June - 2017)

- **Programme:** B.Sc.
- **Semester:** 4
- **Subject:** Mathematics
- **Course code:** 04 (A)-Theory
- **Title of Course:** Linear Algebra & Differential Geometry

- **Section-wise Distribution of Marks for External Examination:**

Total Marks	→70
Marks	

- **Segment-wise Distribution of Marks for Internal Examination:**

Assignments	→ 10 Marks
QUIZ test	→10 Marks
Internal exam.	→ 10 Marks
Total Marks	→30
Marks	

- **Credit Of The Course** 4 Credits

SAURASHTRA UNIVERSITY, RAJKOT

B.Sc. SEMESTER - 4 (CBCS) MATHEMATICS PAPER- 04 (A)

Linear Algebra & Differential Geometry Theory

[70 Marks / $2\frac{1}{2}$ Hours]

- Unit 1:** Vector space, Linear Dependence, Independence of Vectors and Basis of a Vector space:- [14 MARKS]
Introduction of Vector space and vectors in , Definition of a Field, Definition of Vector space, Properties of Vector space, Some Standard Vector space, Examples of Vector space, Linear Combination and Span and Subspace, Concept of Linear combination and its examples, Concept of Linear span and its examples, Concept of Subspaces ,Sum and Direct sum of subspaces and their examples, Complementary subspace, Disjoint subspace, Quotient space, Theorem related to subspaces and Linear span, Linearly dependence of vectors, Linearly independence of vectors, Theorem and Examples based on this, Geometrical Representation of Linearly Dependence and Independence of vectors, Basis of a vector space, Co-ordinates of vectors respect to basis, Existence theorem for basis, Invariance of the number of the elements of a basis set, Examples and theorem of basis.
- Unit 2:** Basis of a Vector space & Dimension of a Vector space:- [14 MARKS]
Basis of a vector space, Co-ordinates of vectors respect to basis, Existence theorem for basis, Invariance of the number of the elements of a basis set, Examples and theorem of basis, Definition of a dimension of Vector space, Existence of Complementary subspace of subspace of finite dimensional vector space, Dimension of sum of subspaces, Example based on dimension, Theorem based on dimension.
- Unit 3:** Linear Transformation:- [14 MARKS]
Concept of Linear Transformation, Zero and Identity Linear Transformation, Properties of Linear Transformation, Example based on Linear Transformation, Range space of Linear Transformation, Nullity and rank of Linear Transformation, Theorem and Example based on Linear Transformation.
- Unit 4 :** Representation of Transformations by Matrices:- [14 MARKS]
Concept of Linear functional , Dual of a vector space, Adjoint of a Linear Transformation, Eigen value and Eigen vectors of Linear Transformation, Eigen basis and Diagonalization of a Linear Transformation.
- Unit 5:** Curvature, Asymptotes and multiple points:- [14 MARKS]
Various formulae for curvature(formulae for Cartesian coordinates, parametric equations and Polar coordinates only), Newton's method for curvature at origin, Concavity, Convexity and point of inflexion, Asymptotes parallel to co-ordinate axes, oblique type and algebraic methods, Rules for finding asymptotes. Multiple points, Types of double points.

Notes:-

- There shall be **SIX** periods of 55 minutes per week for Mathematics- **04 (A)-Theory**.
- There shall be one question paper of **70** marks & $2\frac{1}{2}$ hours for Mathematics- **04 (A)-Theory**

Format of Question Paper

- Question Paper will be of **70 Marks** with the following type of **FIVE questions** covering the whole syllabus in equal weight-age, **each of 14 marks**.
- There will be one question of 14 marks from each of the 5 units
- Question 1, 2, 3, 4, and 5 will cover unit 1, 2, 3, 4, and 5 respectively.

Question no.	(a)	Attempt all FOUR each of ONE mark	4 Marks
	(b)	Answer any ONE out of TWO	2 Marks
	(c)	Answer any ONE out of TWO	3 Marks
	(d)	Answer any ONE out of TWO	5 Marks
TOTAL			14 MARKS

TEXT BOOKS

1. An Introduction to Linear Algebra by Krishnamurthy, Mainra and Arora
2. Differential Calculus by Shanti Narayan, S.Chand & co., New Delhi
3. A course of mathematical Analysis by Shanti Narayan , S.Chand & Co., New Delhi

REFERENCE BOOKS:-

1. Shantinayakan, A course of Mathematical Analysis, S. Chand & Sons.
2. Linear Algebra by J.N. Sharma and A.R. Vasishtha, Krishna Prakashan Mandir, Meerut
3. Matrix and Linear Algebra by K.B. Datta, Prentice Hall of India Pvt. Ltd. New Delhi
4. Linear Algebra by K.Hoffman and R. Kunza
5. A text book of Modern Abstract Algebra by Shanti Narayan, S.Chand & Co., New Delhi
6. Basic Linear Algebra with Matlab by S. K. Jain, A. Gunawardena & P.B. Bhattacharya.

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According to Choice Based Credit System
Effective from June – 2011
(New Syllabus Effective from June - 2017)

- **Programme:** B.Sc.
- **Semester:** 4
- **Subject:** Mathematics
- **Course code:** 04(B) (Practical)
- **Title of Course:** Introduction to SciLab
- **Total Marks of External Practical Examination:** 35 Marks
- **Total Marks of Internal Practical Examination:** 15 Marks
(Continuous internal assessment of practical work)
- **Total Marks of Practical Examination:** External → 35 Marks
Internal → 15 Marks

Total → 50 Marks
- **Credit Of The Course** 3 Credits

B. Sc. SEMESTER -4 (CBCS)
MATHEMATICS-PAPER- 04(B) (Practical) [35 Marks / 3Hours]
Introduction to SciLab

Practical no.	Objective of Practical	MARKS
1.	(1) To input row vectors and column vectors. (2) To input square and rectangular matrices.	9 Marks
2.	(1) To obtain addition, subtraction and Multiplication, division of matrices and multiplication of matrix with scalar. (2) To obtain sub matrices of given matrix and to Delete rows and columns.	
3.	(1) To find minors, cofactors and adjoint of a matrix. (2) To find inverse of the matrix using adjoint of a matrix (3) To learn commands zeros, ones, eye, rand, det(), inv(), command for transpose.	
4.	(1) To draw the graph of a circle. (2) To draw the graph of a parabola	18 Marks
5.	(1) To draw the graph of an ellipse. (2) To draw the graph of a hyperbola.	
6.	(1) To draw graph of $y = \sin(x)$ (2) To draw graph of $y = \cos(x)$. (3) To draw graph of $y = \sec(x)$	
7.	(1) To draw graph of $y = \operatorname{cosec}(x)$. (2) To draw graph of $y = \tan(x)$ (3) To draw graph of $y = \cot(x)$.	
8	(1) To draw graph of $y = \sin^{-1}(x)$ (2) To draw graph of $y = \cos^{-1}(x)$. (3) To draw graph of $y = \sec^{-1}(x)$	
9.	(1) To draw graph of $y = \operatorname{cosec}^{-1}(x)$. (2) To draw graph of $y = \tan^{-1}(x)$. (3) To draw graph of $y = \cot^{-1}(x)$.	
10	(1) To draw graph of $y = \exp(x)$. (2) To draw graph of $y = \log_e(x)$ (3) To draw graph of $y = \log_{10}(x)$.	
11	(1) To draw graph of $y = \cosh(x)$ (2) To draw graph of $y = \tanh(x)$	
12	(1) To draw graph of $y = \operatorname{sech}(x)$ (2) To draw graph of $y = \operatorname{csch}(x)$.	
	Journal and Viva	8 Marks
Total Marks		35 Marks