



Shree H.N.Shukla College of Science Rajkot
MATHEMATICS

T.Y.B.Sc. (Sem.VI) (CBCS)
SYLLABUS

SAURASHTRA UNIVERSITY
RAJKOT

MATHEMATICS

Syllabus
B.Sc.Semester-4

According to Choice Based Credit
System Effective from June-2020

(Updated on 01-01-2020 and updation implemented from June-2020)

SAURASHTRA UNIVERSITYRAJKOT

Syllabus of B.Sc. Semester-
4 According to Choice Based Credit System
Linear Algebra, Real Analysis & Differential Geometry
(New Syllabus Effective from June-2020)

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

- **External Examination:** Total Marks → 70 Marks

- **Segment-wise Distribution of Marks for Internal Examination:**
 - Internalexam. → 10
 - Marks Assignments → 10
 - Marks Quiz → 05 Marks
 - Attendance → 05 Marks

Total Marks → 30 Marks

- **Credit of the Course** 6 Credits

SAURASHTRA UNIVERSITY, RAJKOT

B.Sc. SEMESTER -4(CBCS)

(New Syllabus Effective from June-2020)

MATHEMATICS PAPER-04 (A)

Linear Algebra, Real Analysis & Differential Geometry Theory

[70 Marks / 2¹/₂ Hours]

- UNIT1: Sequences [14 MARKS]**
Definition of a sequence, Bounded sequences, Convergence of a sequence, Limit point of a sequence, Limits Inferior and Superior, Bolzano-Weierstrass Theorem, Convergent sequences, Cauchy's sequence, General principle of convergence of sequence, Algebra of sequences, Subsequence, Monotonic sequences, Some important sequences including $\{\sqrt[n]{n}\}$; $\left\{\frac{a_1+a_2+\dots+a_n}{n}\right\}$
- Unit2: Infinite Series [14 MARKS]**
Series of non-negative terms, Geometric series, p-test, Comparison test, Cauchy's Root test, D'Alembert's Ratio test, Raabe's test, Logarithmic Test, Alternating series. (All the tests without proof).
- 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.
- Unit4: Representation of Transformations by Matrices [14 MARKS]**
Concept of Linear functional, Dual of a vector space, Adjoint of a Linear Transformation, Eigenvalue and Eigenvectors of Linear Transformation, Eigenbasis 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 coordinate 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 and 2.5 hours for Mathematics-04(A)-Theory.

Format of Question Paper

- Question Paper will be of 70Marks with the following type of FIVE questions covering the whole syllabus in equal weightage, 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	4Marks
	(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	5Marks
TOTAL			14MARKS

TEXTBOOKS

1. S.C.Malik and Savita Arora, Mathematical Analysis, New Age International(P)Ltd,Publishers,2ndEdition.
2. A course of mathematical Analysis by Shanti Narayan, S.Chand & Co., New Delhi

REFERENCEBOOKS

1. Shanti Narayan ,A course of Mathematical Analysis, S.Chand & Sons.
2. Walter Rudin, Principle of Mathematical Analysis, MC Graw-HillBook&Company,2nd Edition.
3. Shantinarian, A course of Mathematical Analysis, S.Chand & Sons.
4. Linear Algebra by J.N.Sharma and A.R. Vasishtha, Krishna Prakashan Mandir, Meerut
5. Matrix and Linear Algebra by K.B.Datta, Prentice Hall of India Pvt. Ltd. New Delhi
6. Linear Algebra by K.Hoffman and R. Kunza
7. A textbook of Modern Abstract Algebra by Shanti Narayan, S.Chand & Co., New Delhi
8. Basic Linear Algebra with Matlab by S.K.Jain, A.Gunawardena & P.B. Bhattacharya.

B.Sc. Semester 4
Mathematics Paper No. 04(A)

Linear Algebra, Real Analysis & Differential Geometry
OBJECTIVES

Students will

- Acquire knowledge of Linear Algebra, Real Analysis & Differential Geometry.
- Solve problems of Linear Algebra, Real Analysis & Differential Geometry.

• COURSE OUTCOMES

Students will be able to-

- Recall definitions of terminology related to sequence and series.
- Understand different test of convergence and divergence.
- Judge which test of convergence is applicable.
- Check convergence of series.
- Understand concept of linear transformation and representation transformation by matrices.
- Understand theorems of linear theorem.
- Prove results based on linear transformation.
- Recall concept of curvature, asymptotes and multiple points.
- Understand formulae for Cartesian coordinates, parametric equations and Polar coordinates.
- Find asymptotes and multiple points.

SAURASHTRA UNIVERSITY RAJKOT

Syllabus of B.Sc. Semester- 4 According to Choice Based Credit System *(New Syllabus Effective from June-2020)*

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

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

Introduction to Sci Lab

Practical no.	Objective of Practical	MARKS
1.	(1) To input row vectors and column vectors. (2) To input square and rectangular matrices.	9Marks
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(),	
4.	(1) To draw the graph of a circle. (2) To draw the graph of a parabola	18Marks
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 $y= \cos h(x)$ (2) To draw graph of $y= \tan h(x)$	
12	(1) To draw graph of $y= \sec h(x)$ (2) To draw graph of $y= \operatorname{cosec} h(x)$.	
	Journal and Viva	8Marks
	Total Marks	35Marks

B.Sc. Semester 4
Mathematics Paper No. 04(B)
PRACTICAL: Introduction to SCILAB

OBJECTIVES

Students will

- Know the mathematical software SCILAB.
- Use SCILAB to solve mathematical problems.

• **COURSEOUTCOMES**

Students will be able to-

- Input row vectors, column vectors and matrix.
- Perform operation of matrices.
- Draw graphs of trigonometric functions.
- Draw graphs of hyperbolic functions.