

# Bhavan's Sheth R. A. College of Science

B. Sc. Semester – I, III & V.

Subject : Mathematics

Syllabus distribution for Academic year 2020-21.

Semester	Paper	Unit	Faculty Name
SEM. 1	MAT101 Calculus and Matrix Algebra	Unit: 1 and Unit: 2. Calculus	Mr. Nutan Patel
		Unit: 3 and Unit: 4. Matrix Algebra	Dr. Ravi Borana

**Gujarat University**  
**Choice Based Credit System (CBCS)**  
**Syllabus for Semester I (Mathematics)**  
**MAT 101: Calculus and Matrix Algebra(Theory)**

Hours: 4 /week

Credits: 4

**Unit: I**

Successive Derivatives, standard results for  $n^{\text{th}}$  derivative, Leibniz's Theorem. Definition of limit of a sequence, Convergence and divergence of an infinite series, Alternating Series (**without proof**). Comparison test, Ratio test and Root test, Power series.

**Unit: II**

Rolle's Theorem (**without proof**), Lagrange's and Cauchy's Mean Value Theorems, Increasing and decreasing functions, Taylor's and Maclaurin's Theorems (**both without proof**). Using Taylor's and Maclaurin's Theorem find Maclaurin power series expansion of  $\sin x$ ,  $\cos x$ ,  $\log(1+x)$ ,  $e^x$ ,  $(1+x)^n$  under proper restrictions (if any). Indeterminate forms: all forms of L'Hospital's Rules (**without proof**).

**Unit: III**

Introduction to matrices, different types of matrices, operations on matrices, Theorems on matrices, Elementary operations on matrices and types of matrices, Symmetric and skew-symmetric matrices, Hermitian and Skew-Hermitian matrices. Linear dependence and independence of row and column matrices. Row rank, column rank and rank of a matrix. Row Reduced Echelon (RRE) form of a matrix and matrix inversion using it.

#### Unit: IV

Eigen values, Eigen vectors and the characteristic equation of a matrix. Cayley-Hamilton (CH) theorem (**without proof**) and its use in finding inverse of a matrix. Application of matrices in solving a system of simultaneous linear equations. Cramer's rule. Theorems on consistency of a system of simultaneous linear equations.

#### Reference Books:

1. Calculus and Analytic Geometry – G. B. Thomas and R. L. Finney. Pearson Education. Indian Reprint.
  2. Calculus – James Stewart, Sixth edition, (E-Book).
  3. Calculus – T. M. Apostol. Volume I.
  4. Differential Calculus – Shanti Narayan, P.K. Mittal, S. Chand and Co.
  5. Differential Calculus – Harikishan, Atlantic Publishers.
  6. Calculus – M. Spivak.
  7. An Introduction to Linear Algebra – I. K. Rana, Ane Books Pvt. Ltd.
  8. Linear Algebra Theory and Applications – Ward Cheney, David Kincaid. Jones and Bartlet India Pvt. Ltd.
  9. Introduction to Linear Algebra – Serge Lang. Springer (India).
  10. Matrix and Linear Algebra – K. B. Dutta, Prentice Hall.
  11. A Textbook of Matrices – Shanti Narayan, P K Mittal, S. Chand Group.
  12. Introduction to Linear Algebra – V. Krishnamurthy, Affiliated East-west Press Pvt Ltd.
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