

Syllabus Prescribed for the year 2022-23, UG Programme

Programme : B.Sc.-I (Mathematics)

Semester- I

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods/week)
DSC-I / Mathematics	Algebra and Trigonometry	9+1

Cos: After completing this course, students would be able to

1. Find inverse and normal form of matrices.
2. Evaluate the characteristic equation, eigen value and corresponding eigen vector of a given matrix
3. Evaluate relation between the roots and coefficients of equations.
4. To study application of De Moivre's theorem.
5. Compute summation of trigonometric series.

Unit	Content
Unit I	Various types of matrices, Square matrix, triangular matrix, Hermitian and skew-Hermitian matrix, orthogonal matrices, singular and non- singular matrices, adjoint and inverse of matrix. Elementary transformation of a matrix, inverse of elementary transformation of a matrix, normal form of a matrix. (12 period)
Unit II	Rank of a matrix, row rank, column rank, eigen values, eigen vectors and the characteristic equation of a matrix, Cayley-Hamilton theorem, inverse by Cayley-Hamilton theorem. (12period)
Unit III	Theory of equations: Descarte's rule of signs, relations between the roots and coefficients, transformation of equations, cubic equations. (12 period)
Unit IV	De Moivre's theorem, roots of complex number, circular functions, hyperbolic function, inverse hyperbolic function, relation between circular functions and hyperbolic functions, separation of real and imaginary parts of circular and hyperbolic functions of complex variable. (12 period)
Unit V	Summation of trigonometric series, Gregory series, Euler's series, Machin's series, Rutherford's series, series based on $\sin x$, $\cos x$, $\sinh x$, $\cosh x$ and exponential series. (13 period)
*SEM	
COs: 1.To enhance interest among the students about course. 2. To develop the learning and writing skills. 3. To create mental ability.	
**Activities	1. Unit Test 2. Assignment/ open book test 3. Quiz/ Study Tour

Text books :

- 1] T. M. Karade, Maya S.Bendre, V. G. Mete, R. S. Wadbudhe, S. N. Bayaskar, P. P.Khade:Elements of Algebra and Trigonometry. Sonu-Nilu , Nagpur, 2022.
- 2] V. A. Sharma, V. R. Patil, S. R. Bhojar, G. U. Khapekar, A. N. Rangari: A Text book of Algebra and Trigonometry, Dnyanpath Publication, Amravati, First Edition, 2022.

Reference Books:

1. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd. New Delhi, 2000.
2. H.S. Hall and S.R. Knight, Higher Algebra, H.M. Publications, 1994.
3. S.L .Loney, Plane Trigonometry Part-II, MacMillan & Co., London.
4. Ayres Jr Frank : Matrices : Schaum's outline series, McGraw Hill Book Company, Singapore, 1983.
5. Hohn Franz E : Elementary Matrix Algebra, Amerind Publishing Co., Pvt. Ltd. 1964.
6. Shanti Narayan : A Test Book of Matrices, S. Chand & Co. Delhi.

Programme : B.Sc.-I (Mathematics)**Semester- I**

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods/week)
DSC-II / Mathematics	Differential and Integral Calculus	9+1

Cos: After completing this course, students would be able to

1. Define limit and study the basic properties.
2. Classify continuity and discontinuity of the functions.
3. Solve the differentiability and L'Hospital rule with their applications.
4. Describe the geometrical applications of mean value theorems.
5. Evaluate the reduction formulae for integration.

Unit	Content
Unit I	Limit of a function, $\epsilon - \delta$ definition, basic properties of limits, some standard limits. (12 period)
Unit II	Continuous and discontinuous functions, types of discontinuity, properties of continuous functions, uniform continuous functions, properties of uniform continuous functions. (12 period)
Unit III	Differentiability, successive differentiation, Leibnitz theorem, indeterminate forms and L'Hospital rule. (12 period)
Unit IV	Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Maclaurin's and Taylor's series expansions. (12 period)
Unit V	Integration of the form $\int \frac{P_n(x)}{\sqrt{Q}} dx$, reduction formulae for $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \tan^n x dx$, $\int \cot^n x dx$, $\int \sec^n x dx$, $\int \operatorname{cosec}^n x dx$, $\int \sin^n x \cdot \cos^n x dx$ and Walli's formula. (13 period)
*SEM	
COs: 1. To enhance interest among the students about course. 2. To develop the learning and writing skills. 3. To create mental ability.	
**Activities	1. Unit Test 2. Assignment/ open book test 3. Quiz/ Study Tour

Text books :

1. T.M. Karade, Maya S. Bendre, V. P. Kadam, A.S. Nimkar, K.S. Wankhade, C.D. Wadale: Elements of Calculus (Differential and Integral), Sonu- Nilu, Nagpur, 2022.
2. V. A. Sharma, V. R. Patil, S. R. Bhojar, G. U. Khapekar, A. N. Rangari: A Text book of Differential and Integral Calculus: Dnyanpath Publication, Amravati, First Edition, 2022.

Reference Books :

1. Ayres F Jr. : Differential equations, Schaum's outline series, McGraw Hill, 1981.
2. Ayres F.Jr. : Calculus, Schaum's Outline series, McGRaw Hill, 1981.
3. Edwards J : Differential Calculus for Beginners, MacMillan and Co.Ltd.,1963.
4. Greenspan D. : Introduction to Calculus, Harper and Row, 1968.
5. Gorakh Prasad: Differential Calculus, Pothishala Pvt. Ltd., Allahabad, 1963
6. Gorakh Prasad: Integral Calculus, Pothishala Pvt. Ltd., Allahabad,1981
7. N. Piskunov : Differential and Integral Calculus, Peace Publishers, Moscow.
8. B. Choudhary and D. Somasundaram “A first course in Mathematical analysis”,Narosa Publication.