



B.Sc. Mathematics

SEMESTER - I

Syllabus for - UG B.Sc. Programmes

Course - CBCS

- The Course content has been designed on **Semester pattern**.
- The workload for Theory is allotted on Semester pattern.
- There shall be **02 Theory papers 70 marks** [70+30 marks Internal =100 marks]
- There shall be **Two Semesters** in an academic Year. (Semester-I & II)

SEMESTER-I

Paper No.	Name Of The Paper	Total Marks Ext.+Int*= Total	Passing Standard Ext.+Int = Total	Total Teaching Hours	Credits
MATCC- 101	CALCULUS -I	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	04
MATCC- 102	MATRIX ALGEBRA & THEORY OF EQUATIONS	70+30 =100	28+12=40	15 WEEKS X 4 HOURS =60	04

INTERNAL MARKS: 30



B.Sc. Mathematics

SEMESTER – I

Credit: 04

Syllabus for – UG. B.Sc. Programmes Course – CBCS

Course No – MAT.-CC - 101

Title of the Paper: CALCULUS –I

Marking Scheme:	Semester End Examination:	70
	Internal Examination:	30
	TOTAL	100

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	Revision of algebra of limits and its standard forms, Indeterminate forms, L' Hospital's first rule, L' Hospital's second rule.	12	14
2	Definition of limit of a sequence, Convergence and divergence of an infinite series, Comparison test, Ratio test, Root test, Radius and interval of convergence of power series.	12	14
3	Revision of algebra of derivatives and its standard forms, Successive Derivatives, standard results for n^{th} derivative, Leibniz's Theorem and examples based on it.	12	14
4	Revision of algebra of integration and its standard forms, Reduction Formulae for $\int \sin^n x \, dx$, $\int \cos^n x \, dx$, $\int \sin^m x \cos^n x \, dx$ and $\int \tan^n x \, dx$ $\int_0^{\frac{\pi}{2}} \sin^n x \, dx$, $\int_0^{\frac{\pi}{2}} \cos^n x \, dx$, $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x \, dx$, , Where $m, n \in \mathbb{N}$ with $m, n \geq 2$.	12	14
5	Mean value theorems: Rolle's theorem, Lagrange's and Cauchy's mean values theorems, Taylor's theorem. Expansion in power series of $\sin x$, $\cos x$, $\log(1+x)$, e^x and $(1+x)^m$ (in appropriate domain)	12	14

Continous Internal Evaluation: **30 Marks**

Reference books:

- Differential Calculus by Shanti Narayan & Differential Calculus by Gorakh Prasad
- Integral Calculus by Shanti Narayan & Integral Calculus by Gorakh Prasad
- Calculus - Thomas and Finney , Pearson Education , Asian edition
- Calculus - Dr. Elliot Mendel son, Mc GrawHill Book co.
- A first course in calculus fifth edition By Serge Lang , Springer India
- Mathematical sciences(UGC CSIR) by Pawan Sharma, Neha Sharma and Suraj singh. (Arihant publication india)



B.Sc. Mathematics

SEMESTER – I

Credit: 04

Syllabus for – UG. B.Sc. Programmes Course – CBCS

Course No – MAT.-CC - 102

Title of the Paper: MATRIX ALGEBRA & THEORY OF EQUATIONS

Marking Scheme: Semester End Examination: 70

Internal Examination: 30

TOTAL 100

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
1	Matrices: matrix operations (Addition, Scalar Multiplication, Multiplication, Transpose, Adjoint and their properties); Special types of matrices :Null, Identity, Diagonal, Triangular, Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary, Normal, Idempotent, Nilpotent ,Involuntary	12	14
2	Algebra of determinants and its properties, Solution of the matrix Equation $AX = B$; Row reduced Echelon form of matrix and Matrix inversion using it, Linear dependence and independence of rows and columns of a matrix.	12	14
3	Row rank, column rank and rank of a matrix. Equivalence of row rank and column rank of matrix, Eigenvalues, eigenvectors and the characteristics equation of a matrix.	12	14
4	Cayley- Hamilton theorem and its use in finding inverse of a matrix. Application of matrices to a system of a linear equation. Theorems on system of consistency of linear equations, solution of system linear equation in three variables by Cramer's rule.	12	14
5	Relations between roots and coefficients of a polynomial equation in one variable. Transformation of equations, Descartes' rule of signs. Solution of cubic equations by Cardan method, Solution of Biquadratic equation by Ferrari method .	12	14

Continous Internal Evaluation: **30 Marks**

Reference books:

- Matrix and linear algebra by K. B. Dutta Prentice Hall
- Higher Algebra by H. S. Hall and S. R. Knight H. M.
- Theory of matrices by Vatssa Wiley-Eastern & Element of co-ordinate Geometry by S. L. Loney and Elementary Treatise on Co-ordinate Geometry by R. J. T. Bell
- Higher Algebra by Barnard S. and Child J. M.



B.Sc. Mathematics

SEMESTER - II

Syllabus for - UG B.Sc. Programmes

Course - CBCS

- The Course content has been designed on Semester pattern.
- The workload for Theory is allotted on Semester pattern.
- There shall be 02 Theory papers 70 marks [70+30 marks Internal =100marks]
- There shall be Two Semesters in an academic Year. (Semester-I & II)

SEMESTER-II

Paper No.	Name Of The Paper	Total Marks Ext.+Int*= Total	Passing Standard Ext.+Int = Total	Total Teaching Hours	Credits
MATCC-201	CALCULUS -II	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	04
MATCC-202	THREE DIMENSIONAL GEOMETRY	70+30 =100	28+12=40	15 WEEKS X 4 HOURS =60	04

INTERNAL MARKS: 30



**B.Sc. Mathematics
SEMESTER – II**

Credit: 04

Syllabus for – UG. B.Sc. Programmes Course – CBCS

Course No – MAT.-CC - 201

Title of the Paper: CALCULUS – II

<u>Marking Scheme:</u>	<u>Semester End Examination:</u>	70
	<u>Internal Examination:</u>	30
	TOTAL	100

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
1	Revision of Ordinary differential equation , Order and degree of differential equation, Variable separable equation, Homogeneous differential equation and Non- homogeneous differential equations.	12	14
2	Differential Equations of First Order and First Degree: Definition and method of solving of Linear differential equations of first order and first degree , Definition and method of solving of Bernoulli's differential equation and Definition and methods of solving of Exact differential equation.	12	14
3	Differential equations of first order and higher degree: Differential equations of first order and first degree solvable for x, solvable for y, solvable for p. Clairaut's form of differential equation and Lagrange's form of differential equations.	12	14
4	Linear differential equations of higher order Linear differential equations of higher order with constant coefficients . Operator D, Meaning of auxiliary equation, Roots of auxiliary equation and solution of auxiliary equation $f(D)y = 0$ for real roots and complex roots, Operator $1/D$. Solution of differential equations of the type $f(D)y = X$. Meaning of complimentary function(C.F.) and Particular integral(P.I.). Methods to obtain Particular integral(P.I.) when $X = e^{ax}$, $X = \sin(ax+b)$, $X = \cos(ax+b)$, $X = x^m$, $X = e^{ax}.V$	12	14
5	Linear differential equations with variable coefficients. Their applications, equation reducible to with constant coefficients . Second order linear differential equations.	12	14

Continous Internal Evaluation: **30 Marks**



Reference books:

- Differential Calculus by Shanti Narayan
- Differential Calculus by Gorakh Prasad
- Integral Calculus by Shanti Narayan
- Integral Calculus by Gorakh Prasad
- Calculus - JAMES STEWART , THOMSON BROOKS/COLE
- Calculus - T.M.Apostol
- Calculus - Thomas and Finney , Pearson Education , Asian edition
- Calculus - Dr. Elliot Mendel son, Mc GrawHill Book co.
- A first course in calculus fifth edition By Serge Lang , Springer India
- Differential Equations by D. A. Murray
- Differential Calculus – Harikishan, Atlantic Publishers.
- Calculus – M. Spivak.
- Mathematical sciences (UGC CSIR) by Pawan Sharma, Neha Sharma and Suraj singh. (Arihant publication india)



**B.Sc. Mathematics
SEMESTER – II**

Credit: 04

Syllabus for – UG. B.Sc. Programmes Course – CBCS

Course No – MAT.-CC - 202

Title of the Paper: THREE DIMENSIONAL GEOMETRY

<u>Marking Scheme:</u>	<u>Semester End Examination:</u>	70
	<u>Internal Examination:</u>	30
	TOTAL	100

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
1	Sphere, Intersection of a line and a sphere. Equation of tangent plane and normal. Plane section of sphere. Intersection of two spheres. Angle between two spheres. Orthogonal spheres.	12	14
2	Definition of a cone. Its vertex and guiding curve. Its equation with given vertex and guiding curve. Homogenous equation and cone with vertex origin. Right circular cone. Its equation with given vertex, axis and semi vertex angle	12	14
3	Definition of a cylinder. Its equation with generators intersecting a given curve and parallel to a line. Right circular cylinder. Its equation with given axis and radius.	12	14
4	Conicoids: Central and non-central conicoids, Ellipsoid, Hyperboloid of two sheets and one sheet. Elliptic paraboloid and hyperbolic paraboloid. Intersection of a line and a conicoid. Equation of tangent plane and normal of conicoids.	12	14
5	Polar co-ordinate. Polar co-ordinate and Cartesian co-ordinate system and mutual relation, equation of a line, a circle and conics in polar co-ordinates. Spherical and cylindrical co-ordinate in R^3 . Their relation with Cartesian system.	12	14

Continous Internal Evaluation: **30 Marks**

Reference books:

- Co-ordinate geometry of Three dimensions : Shantinakaran
- Higher Algebra : Barnard S. and Child J. M.
- Element of co-ordinate Geometry : S. L. Loney
- Elementary Treatise on Co-ordinate Geometry : R. J. T. Bell