4 Year Bachelor of Science/ Arts (MATHEMATICS) CBCS

List of Major Core Courses (MJC):

Sl. No.	Sem	Course Code	Name of the Course	Credits	Marks
1.	I	MJC-01	Algebra	6	100
2.	II	MJC-02	Calculus &Geometry	6	100
3.	III	MJC-03	Real Analysis	5	100
4.	III	MJC-04	Ordinary Differential Equations	4	100
5.	IV	MJC-05	Theory of Real Functions	5	100
6.	IV	MJC-06	Group Theory	5	100
7.	IV	MJC-07	Partial Differential Equations	5	100
8.	V	MJC-08	Ring Theory and Linear Algebra-I	5	100
9.	V	MJC-09	Multivariate Calculus	5	100
10.	VI	MJC-10	Complex Analysis	4	100
11.	VI	MJC-11	Metric Space	5	100
12.	VI	MJC-12	Riemann Integration and Series of Functions	5	100
13.	VII	MJC-13	Ring Theory and Linear Algebra-II	5	100
14.	VII	MJC-14	Research Methodology	5	100
15.	VII	MJC-15	Numerical Methods	6	100
16.	VIII	MJC-16	Mathematical Finance	4	100
Sub Total = 80					

4 Year Bachelor of Science/ Arts (MATHEMATICS) CBCS

List of Minor Core Courses (MIC):

Sl. No.	Sem.	Course Code	Name of the Course	Credits	Marks
1.	I	MIC-01	Algebra	3	100
2.	II	MIC-02	Calculus &Geometry	3	100
3.	III	MIC-03	Real Analysis	3	100
4.	IV	MIC-04	Ordinary Differential Equations	3	100
5.	V	MIC-05	Theory of Real Functions	3	100
6.	V	MIC-06	Group Theory	3	100
7.	VI	MIC-07	Partial Differential Equations	3	100
8.	VI	MIC-08	Ring Theory and Linear Algebra-I	3	100
9.	VII	MIC-09	Multivariate Calculus	4	100
10.	VIII	MIC-10	Complex Analysis	4	100
Sub Total = 32					

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MATHEMATICS
Semester-II
MJC-02: Calculus & Geometry (06 credits) (Lecture: 60)

Course Objectives: The primary objective of this course is to introduce the basic tools of calculus and geometric properties of different conic sections which are helpful in understanding their applications in planetary motion, design of telescope and to the real-world problems.

Course Learning Outcomes: This course will enable the students to:
i) Apply derivatives in Optimization, Social sciences, Physics and Life sciences etc.
ii) Compute area of surfaces of revolution and the volume of solids by integrating over cross-sectional areas.

Course Contents:

Unit 1 (Lectures: 12)
Successive differentiation and Leibnitz's theorem, Maclaurin 's and Taylor's series of Expansion, Tangent and Normal, Partial differentiation and Euler's theorem, Total Differential, L'Hospital's rule, , Curvature, Asymptotes, Curve tracing in Cartesian coordinates and polar coordinates of standard curves.

Unit 2 (Lectures: 12)
Integration of rational and irrational functions. Evaluation of definite integrals, Reduction formulae. Area, Length of plane curves and area bounded by plane curves. Volume and surface area of solid of revolution, Beta and Gamma Functions, Multiple Integrals.

Unit 3 (Lectures: 10)
Transformation of rectangular axes, General equations of conics and its reduction to the normal form, Equation of the tangent and normal at a point of the Conics.

Unit 4 (Lectures: 12)
Sphere, Cone, Cylinder, Central conicoid, Paraboloids, Plane section of conicoid, Generating lines, Tangent plane and normal to a conicoid.

Unit 5 (Lectures: 14)
Scalar triple product and vector triple product, Product of four vectors, Introduction to vector functions, Operations with vector-valued functions, Differentiation and integration of vector functions, Gradient of a scalar and Divergence and Curl of a vector function in Cartesian coordinate.

References:

1. Anton, Howard, Bivens, Irl, & Davis, Stephen (2013). *Calculus* (10[th]ed.). John Wiley & Sons Singapore Pte. Ltd. Indian Reprint (2016) by Wiley India Pvt. Ltd. Delhi.
2. Osborne, George. A. (1906). *Differential and Integral Calculus with Examples and Applications*. Revised Edition. D. C. Health & Co. Publishers. Boston, U.S.A.
3. Strauss, Monty J., Bradley, Gerald L., & Smith, Karl J. (2007). *Calculus* (3[rd]ed.). Dorling Kindersley (India) Pvt. Ltd. (Pearson Education). Delhi. Indian Reprint 2011.

Additional Readings:

1. Thomas, Jr. George B., Weir, Maurice D., & Hass, Joel (2014). *Thomas' Calculus* (13[th]ed.). Pearson Education, Delhi. Indian Reprint 2017.
2. Lalji Prasad , Integral Calculus, Paramount Publications Patna
3. B.C. Das and B.N. Mukherjee, Differential calculus , Integral Calculus, Dhur & Sons Pvt.Ltd. Kolkatta
4. Shanti Narayan , P.K.Mittal , Integral Calculus, S. Chand, New Delhi
5. Utpal Chatterjee, Vector and Tensor Analysis , Academic Publishers ,Kolkatta
6. Dasgupta , Differential Calculus, Bharti Bhawan Patna