OBJECTIVES:

1. Learn to work with infinite sequences and series.

2. Learn how differential equations appear in real life and physical phenomena, and teach them the main three methods, namely analytic, geometric and numerical methods, for studying differential equations.

3. To review the key concepts, emphasizing geometric understanding and visualization.

4. Learn the mathematical operations that apply to vectors; see how to use vectors and their operations to compute angles and areas, projections, and equations of lines and planes in space; and explore a few basic physical applications of vectors and their operations.

5. To familiarize the students with concept and applications Coordinate Geometry of Three Dimensions.

6. Learn fundamental statistical concepts and some of their basic applications in science and society. Show proficiency in basic statistical skills embedded in their courses.

7. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.

8. Apply numerical methods to obtain approximate solutions to mathematical problems.

BSM 202 GENERAL MATHEMATICS- II										
Teaching Scheme					**Examination Scheme**					
L	**T**	**P**	**C**	**Hrs./Week**	**Theory**			**Practical**		**Total Marks**
					MS	**ES**	**IA**	**LW**	**LE/Viva**	
3	**1**	**---**	**4**	**4**	**25**	**50**	**25**	**---**	**---**	**100**

UNIT I **10**

Sequence and Series: Convergence and divergence. Simple tests for convergence. Absolute convergence. Fourier series.

UNIT II **10**

Vectors and Coordinate Geometry (3D): Vectors and their algebra. Simple applications to geometry and mechanics. Unit vectors, vectors i, j and k. Components of a vector. Position vector. Direction cosines and direction ratios. Dot and cross products. Projection of a vector on another. Distance between two points. Equations of a line, plane and sphere. Intersections. Distance between two points. Shortest distance between lines.

UNIT III **10**

Elementary Differential Equations: Definitions of order, degree, linear, nonlinear, homogeneous and nonhomogeneous. Solution of first order equations. Complementary function and particular integral. Initial and boundary value problems. Linear differential equations with constant coefficients. Cauchy-Euler equation. Solution in series.

UNIT IV **09**

Basic Statistics and Numerical Methods: Classification of data. Mean, mode, median and standard deviation. Method of least squares. Newton-Raphson method. Linear and quadratic interpolation. Simpson's rule. Runge-Kutta method.

APPROXIMATE TOTAL **39 Hours**

Texts and References

1. **Thomas, G. B. and Finney, R. L.,** Calculus and analytical geometry, 9th Ed., Pearson Education Asia (Adisson Wesley), New Delhi, 2000
2. **NCERT,** Mathematics Textbook for class XI and XII, 2009.
3. **Sharma, R.D.,** Mathematics, Dhanpat Rai Publications, New Delhi, 2011.
4. **Raisinghania, M.D.,** Ordinary and Partial Differential Equations by, 8th edition, S. Chand Publication (2010).

OUTCOMES:

1. Determine if an infinite sequence is bounded/monotonic/convergent/divergent.

2. Determine if an infinite series is convergent or divergent by selecting the appropriate test from the following: (a) test for divergence; (b) integral test; (c) p-series test; (d) the comparison tests; (e) alternating series test; (f) absolute convergence test; (g) ratio test; and (h) root test.

3. Define and give qualities of a **scalar** and **vector**.

4. Express a 3-D vector in Cartesian coordinates.

5. Study properties of dot product and cross product.

6. Work with parametric equations of a line, plane and sphere and their possible intersections.

7. Finding distance between two points and shortest distance between two lines.

8. Formation of ordinary differential equations (ODEs), their degree and order.

9. Methods of solving various types of ODEs.

10. To make mathematical models involving differential equations for problems encountered in engineering, social and physical sciences, and to solve them by using one or a combination of the methods available.