

THIRD SEMESTER

MT601: ANALYSIS AND ADVANCED CALCULUS-I

Syllabus: Normed linear spaces, Quotient space of normed linear spaces and its completeness. Banach spaces and examples; Bounded linear transformations; Normed linear space of bounded linear transformations, Weak convergence of a sequence of bounded linear transformations. Equivalent norms; Basic properties of finite dimensional normed linear spaces and compactness, Reisz Lemma, Multi linear mapping; Open mapping theorem; Closed graph theorem; Uniform boundness theorem; Continuous linear functional; Hahn-Banach theorem and its consequences. Embedding and Reflexivity of normed spaces. Dual spaces with examples; Inner product spaces. Hilbert space and its properties; Orthogonality and Functional in Hilbert Spaces. Pythagorean theorem. Projection theorem; Orthonormal sets; Bessel's inequality, Complete orthonormal sets. Parseval's identity; Structure of a Hilbert space. Riesz. representation theorem, Reflexivity of Hilbert spaces;

UNIT SCHEDULE

- Unit 1** Normed linear spaces
- Unit 2** Bounded linear transformations
- Unit 3** Fundamental theorem of Functional Analysis
- Unit 4** Continuous linear functional
- Unit 5** Hilbert space and Its Basic properties
- Unit 6** Orthogonality and Functional in Hilbert Spaces
- Unit 7** Operators on Hilbert Space