M.A/M.Sc Mathematics Semester 4th

Effective from academic session 2011 ⟹ **Repetition for 2012 with minor change**

ADVANCED TOPICS IN THE ANALYTICAL THEORY OF POLYNOMIALS

Course No. MM-OP-404

Unit I

The fundamental theorem of algebra (revisited), symmetric polynomials, The Continuity theorem, Orthogonal Polynomials, General Properties, The Classical Orthogonal Polynomials, Tools from Matrix Analysis.

Unit II

Critical points in terms of zeros, Fundamental results on critical points, Convex Hulls and Gauss-Lucas theorem, Some applications of Gauss-Lucas theorem. Extensions of Gauss-Lucas theorem, Average distance from a line or a point Real polynomials and Jenson's theorem , Extensions of Jenson's theorem.

Unit III

Derivative estimates on the unit disc, Bernstein's inequality and generalizations. Refinements, Conditions on the coefficients, Inequalities for polynomials having all zeros on the unit circle. Self-reciprocal polynomials, conditions on the zeros. Inequalities for polynomials involving mean values.

Unit IV

Inequalities of S. Bernstein and A. Markov on the unit interval, Extensions of higher order derivatives. Estimates for individual coefficients of polynomials, Inequalities involving two coefficients, Inequalities involving all the coefficients, Coefficient estimates of real trigonometric polynomials. Sharp estimates for individual coefficients.

Recommended Books

1. Analytic theory of Polynomials by Q.I. Rahman and G.Schmeisser.
2. Geometry of polynomials by Morris Marden.

Suggested Readings:

1. Topics in polynomials :extremal properties, problems, inequalities, zeroes by G.V.Milovanovic,D.S.Mitrinovic and Th. M. Rassias
2. Problems and theorems in Analysis II by G.Polya and G.Szego (Springer Verlag New York Heidelberg Berlin).