

Semester – IV

ADVANCED TOPICS IN THE ANALYTICAL THEORY OF POLYNOMIALS

Course No. MM-CP-406
Duration of Examination: 3 hrs

Maximum Marks: 100
(a) External Exam: 80
(b) Internal Exam: 20

Unit I

Introduction, The fundamental theorem of algebra,(Revisited) Symmetric polynomials, The Continuity theorem, Orthogonals Polynomials, General Properties, The Classical Orthogonal Polynomials, Harmonic and Sub Harmonic functions, Tools from Matrix Analysis.

Unit II

Critical points in terms of zeros, Fundamental results and 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 Jensen's theorem , Extensions of Jensen's theorem.

Unit III

Derivative estimates on the unit interval, Inequalities of S. Bernstein and A. Markov , Extensions of higher order derivatives, Two other extensions, Dependence of the bounds on the zeros, Some special classes, L^p analogous of Markov's inequality.

Unit IV

Coefficient Estimates, Polynomials on the unit circles. Coefficients of real trigonometric polynomials. Polynomials on the unit interval.

References:

1. Analytic theory of Polynomials by Q.I. Rahman and G.Schmeisser.
2. Geometry of polynomials by Morris Marden.
3. Topics in polynomials :extremal properties, problems, inequalities, zeroes by G.V.Milovanovic,D.S.Mitrinovic and Th. M. Rassias
4. Problems and theorems in Analysis II by G.Polya and G.Szego (Springer Verlag New York Heidelberg Berlin)