Abstract of Ph.D. Thesis

Name of the Scholar : Chanam Barchand Singh

Name of Supervisor : Prof. (Mrs.) Kum Kum Dewan
Department of Mathematics
Jamia Millia Islamia

Title of the Thesis : Growth of Polynomials.

The thesis entitled "GROWTH OF POLYNOMIALS" comprises five chapters. In the first chapter, we have studied inequalities on the Maximum Modulus of Polynomial and its Derivative. The second and third chapters deal respectively with Bernstein and Turán types of inequalities for the polar derivative of a polynomial. In the fourth and fifth chapters, we obtain integral mean inequalities for the ordinary and polar derivative of polynomials.

If $p(z)=\sum_{\upsilon=0}^{n} a_{\upsilon} z^{\upsilon}$ is polynomial of degree n, $p'(z)$ its derivative and $M(p,r)=\max_{|z|=r}|p(z)|$,

then Bernstein's inequality [7], is

$$M(p',1)\leq n M(p,1) \tag{1}$$

And
$$M(p,R)\leq R^{n} M(p,1), \text{ for } R\geq 1 \tag{2}$$

$$M(p,r)\geq r^{n} M(p,1), \text{ for } r\leq 1. \tag{3}$$

Inequality (2) is a deduction from Maximum Modulus Principle [23, 22] and (3) is due to Zarantonello and Varga [25].

In chapter-1, we (see [8]) obtain improvements of the result due to Dewan et. al. [16] (see also [5]) which improves upon the results proved by Rivlin [24], Govil [20], Dewan [11] (see also [12]), respectively and that due to Aziz and Zargar [6] and some other results.

In Chapter-2, for the lacunary polynomials we (see [17]) extend the results due to Chan and Malik [10], (see also[3] and [21]), Aziz and Zargar [6], Aziz and Shah [5], and Dewan and Mir [15] to polar derivatives.

In chapter-3, we extend results due to Dewan et. al. [13, 14, 16, 18], into polar derivatives.

In chapter-4, considering the class of polynomials of degree $n \geq 3$, and by involving co-efficients, we (see [9]) obtain best possible bounds concerning the integral mean inequalities, which improve the results of Aziz [1], and Aziz and Ahemad [2]. .Further, we obtain an integral inequality analogous to the inequality due to Gardner, Govil and Weems [19], which improves many earlier results.

In the last chapter, some integral mean inequalities for the polar derivative of a polynomial have been obtained which improve as well as generalize results due to Aziz and Shah [4], and Dewan et. al. [16] and have some interesting consequences as well.