

ON THE PROBLEM OF THE CHEMIST MENDELEEV AND RELATED PROBLEMS ON POLYNOMIALS

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The thesis entitled, "ON A PROBLEM OF THE CHEMIST MENDELEEV AND RELATED PROBLEMS ON POLYNOMIALS" consists of four chapters. The first chapter deals with the inequalities for polynomials and their derivatives. In the second chapter, certain problems concerning the inequalities for the polar derivative of a polynomial are investigated. In the third Chapter, we study problems on the maximum modulus of polynomials and the fourth chapter concerns the L^p - inequalities for polynomials with restricted zeros.

In Chapter-1, we have firstly prove a result which improves upon a result due to Qazi for the polynomials of degree n greater than or equal to 2, having no zeros in modulus z less than K , K greater than or equal to 1. We have next considered the polynomials having no zeros in modulus z less than K , K less than or equal to 1 and obtained improvements of a result due to Govil. For the class of polynomials $p(z)$, having no zeros in modulus z less than K , K greater than or equal to 1, we have obtained a result which is a generalization as well as an improvement of the result due to Govil. For the same class of polynomials, we have again improved a result due to Govil by involving minimum of modulus $p(z)$ over $\text{mod. } z = k$. Besides this, we have obtained results which generalizes the well known result of Govil, Rahman and Schmeisser.

In Chapter-2, firstly we prove a result which improves some or all the coefficients $a_0, a_1, a_2, \dots, a_n$ and is an improvement of a result due Aziz and Rather. We have next considered the class of polynomials $p(z)$ of degree n greater than or equal to 3 having all its zeros in modulus z less than K , K greater than or equal to 1 and obtained an improvement as well as a generalization of a result due to Govil to the polar derivative by involving coefficients a_1 and a_2 . For this class of polynomials we have also obtained a result in polar derivative which improves as well as generalizes a result due to Govil by involving minimum modulus $p(z)$ over $\text{mod. } z = k$. We also generalized and improved a result of Govil in polar derivative for polynomials having no zeros in modulus z less than 1. Further, for the class of polynomials $p(z)$ not equal to 0, modulus z less than K , K less than or equal to 1, we have obtained an extension of a result due to Govil to polar derivatives. Besides this, we have we have also obtained inequalities in polar derivatives of polynomials having no zeros in modulus z less than K , K greater than or equal to 1.

In Chapter -3, we firstly improve upon the results due to Jain. For the class of polynomials having no zeros in modulus z less than K , K greater than or equal to 1, we have obtained an improvement of a result due to Aziz. Further, we have improved upon a result due to Qazi for the class of polynomials $p(z)$, not vanishing in the disk modulus z less than K , K greater than or equal to 1. Besides this, some other results have also

been proved.

In Chapter-4 , we extend as well as generalize a result due to Aziz for the class of polynomials having all its zeros in modulus z less than K , K greater than or equal to 1. Next,we consider the class of polynomials having a zero of order s at the origin and the rest of its zeros outside or on the circle of the radius K , K greater than or equal to 1 and obtain the result which improves and generalizes a result due to Govil and Rahman for $r=2$ by involving the coefficients. Some other results which improve upon the results of Jain have also been proved.