

# Abstract

In this thesis we study the extremal properties for  $K_1 + (K_1 \cup K_{n-k-1})$  relatively to zeroth-order general Randić index, general sum-connectivity index and general Randić connectivity index provided  $\alpha \geq 1$  and general hyper-Wiener index for any  $\alpha \neq 0$ . Also, for 2-(vertex or edge)-connected graphs of order  $n$  and  $\alpha > 0$  the unique graph minimizing these indices is the  $n$ -vertex cycle  $C_n$ .

Further we determine the connected unicyclic graph  $G$  of order  $n \geq 3$  with  $k$  pendant vertices ( $0 \leq k \leq n - 3$ ) having minimum  $\chi_\alpha(G)$  for  $-1 \leq \alpha < 0$ .

At the end we determine the connected bicyclic graphs  $G$  of order  $n \geq 4$  reaching maximum  $\chi_\alpha(G)$  for  $-1 \leq \alpha < 0$ .