The work discussed in this thesis covers many aspects of the characteristics of ring and rotor spun yarns subjected to swelling and stretching in aqueous medium, sodium hydroxide and zinc chloride and other treatments such as resin finishing and chemical modifications such as acetylation, benzoylation and cyanoethylation. The aim of this thesis is to provide basic information which is needed to produce cotton fabrics from ring and rotor spun yarns with a better balance of physical properties.

For this purpose, yarns of 16's count (39 tex) produced on ring and rotor spinning systems were used. They were subjected to the treatments outlined above, and the various physical properties such as tenacity, elongation, static modulus, dynamic modulus, bending rigidity, buckling recovery, lateral and longitudinal compression, friction, abrasion and fatigue were determined. The measurement of bending properties was made by using KES-F bending tester and for measuring the buckling behaviour an attachment to Instron was fabricated. The measurement of fatigue was made by fabricating a fatigue tester based on the principle of biaxial rotation over a pin. The measurement of compression of yarns was made by using KES-F compression tester.
Friction and abrasion were determined by using specialized equipment.

Thus the new data on properties of treated ring and rotor spun yarns have been provided to have a better understanding of the treatments given.

A survey of principal mechanical properties such as tenacity and elongation in the treated materials shows that the major effect of swelling in slack state is to produce higher extensibility in the products than the scoured yarns. With sodium hydroxide of mercerizing strength this higher extensibility is also accompanied by a slight decrease in strength. Zinc chloride treatment in slack state on the other hand has resulted in an increase in strength accompanied by a drop in elongation. The shrinkage of the yarns is found to be higher with sodium hydroxide treatment compared to zinc chloride. However, rotor spun yarns are characterised by higher values of shrinkage. The treatment of the yarns with swelling agents under stretch conditions has generally led to an increase in tenacity accompanied by a drop in extension. The rate at which the strength increases is found to be greater in sodium hydroxide compared to zinc chloride. The aqueous swelling and stretching treatments given to the yarns show that rotor spun yarns display a significant increase in tenacity without any deterioration in elongation.
The effect of resin finishing after slack treatment in both sodium hydroxide and zinc chloride is to cause a reduction in tenacity accompanied by an increase in elongation. In the case of stretch treated yarns, a significant increase in tenacity is noticed, and also it is found that the percent retained strength is higher in sodium hydroxide.

The cyanoethylation has also led to an increase in tenacity in the case of rotor spun stretch mercerized. The bending behaviour of these treated yarns has been examined.

The effect of aqueous treatment on the yarns shows some interesting results in that an increase in bending hysteresis accompanied by a reduction in bending rigidity has been observed. The degree of set and buckling recovery are affected by the treatments. The compressibility of yarn is influenced by the treatments given.

Most of the treatments seem to increase the coefficient of friction with the exception of aqueous swelling treatments. Rotor spun yarns are characterised by higher abrasion resistance.

The aqueous treatment has found to increase the dynamic modulus, the increase is significant with regard to ring spun yarns only. Rotor spun yarns, both untreated and
treated, are characterised by higher fatigue life. The aqueous treatment has led to a drop in the fatigue life in both the cases and the same trend is noticed in resin treated yarns. A significant observation is that sodium hydroxide treatment is more favourable to ring and rotor spun yarns compared to zinc chloride. Chemical modification in slack form seems to be beneficial in improving the fatigue life in both the yarns.

The implications of this study have been fully discussed.