CHAPTER - I

GENERAL INTRODUCTION
After the introduction of synthetic fibres, the textile scenario has undergone a considerable change in India in the last two decades owing to a marked change in the raw material character and range. The need for higher productivity and efficient utilization of machines to lower the cost of production has also been well emphasised. These developments have underlined the urgency for modernisation of spinning industry. As a result many new spinning technologies which appeared on the international scene are gradually making their way into the Indian textile industry too.

Of the various emerging spinning technologies, rotor-spinning has made the most profound impact on the world textile industry. Its acceptance as a commercially viable process is now beyond dispute. One needs only to refer to statistics showing the number of rotor machines sold throughout the world to appreciate its increasing importance. In addition to cellulosic fibres like cotton and viscose rayon, practically all the synthetic fibres and their blends can now be successfully spun on this system. Lot of research aimed at the production of quality yarns and improved performance of rotor spinning frames has been carried out in the last two decades. A number of machine parameters and design factors have been studied and suitably modified. The rotor speeds have already more than doubled compared to the first commercial machine. By automation of yarn-piecing, rotor-cleaning and doffing operations, the
yarn quality and the machine productivity have been further enhanced.

In the last decade a number of conferences and symposia were held on the commercial application and acceptance of rotor-spinning for processing of man-made fibres and their blends for specific applications. Though 15% of the rotor-spinning capacity so far has been devoted to 100% synthetic fibre yarns, Bowen [1] believes that this will further increase as the numerous efforts of inventors and machinery manufacturers lead to a further improvement in the spinning performance of man-made fibres. This trend would be reinforced due to incorporation of certain modifications in fibre crimp and surface finish. It is stated that viscose rayon yarns can be easily spun on the rotor frame which could be suitable for upholstery, loose furnishings, and other applications [2]. There have also been a number of studies on processing of the blends of polyester with cellulosic fibre [3] on rotor spinning frames; they, however, are reported to be abrasive and tend to push up machine-parts replacement cost [4]. Kajuter [3], who studied the influence exerted by varying linear density and length of polyester-rayon fibres on the characteristics of rotor-spun yarns, found that these characteristics together with flexural and torsional rigidities have a relatively great influence on the tenacity, breaking extension and irregularity of these yarns. In a study by Kasparek [5], it was shown that an excessive surface cohesion, electrical
conductivity and abrasion resistance may have an adverse effect on the otherwise good spinning performance. This may necessitate a suitable choice of raw material and optimum technology of sliver preparation. Many other papers [6-10] concerned with the spinning of man-made fibres on rotor spinning frames constitute a remarkable documentation of the progress in and the possibilities for processing synthetic fibres through rotor-spinning. However, only a few studies have been carried on the spinning potential of acrylic and its blend, especially with viscose rayon. Some work had been carried on the processing of acrylic fibre rotor yarn for carpet application [2,11]. Since the two fibres i.e. acrylic and viscose, are different in stiffness etc., the question of utilizing such binary blends for rotor spinning requires investigations on their spinning performance. The characteristics of rotor yarns from such binary blends are expected to be significantly influenced by the blend proportion and the yarn twist.

Further, the relatively high twist generally used for rotor-spun yarns leads to snarling and spirality in knitted fabrics. An effective treatment is often required to counter these problems. Of the different methods of stabilizing, steaming has been widely recognised to be an effective means of overcoming these problems. Its influence on other yarns characteristics necessitate a comprehensive study.
Since the introduction of a new technology always affects the downstream processes, the implications of rotor spinning need examination not only by the spinners but also by weavers, knitters and finishers. According to the Textile Institute of Enka Glanzstoff, no opportunity should be lost in exploiting rotor yarns in the weaving sector. These yarns will have a stimulating effect on the development of new knit-wears and the existing trend towards woolly goods, replacing the relatively smooth construction using ring spun yarns, would be accelerated. What appears to be of particular importance is the possibilities of knitting man-made fibre rotor spin yarns and investigating the characteristics of the knits made therefrom. Considerations determining the suitability of the yarn to be used should include various aspects of fabrics such as hand, fabric weight, bulk, insulation etc. With many fibres now at the command of the industry, the yarns can be practically engineered for any given application. Since each fibre offers a combination of properties and imparts certain characteristic functional and aesthetic properties to knits made from that fibre, a recognition of the contribution and limitations of different fibres suggests blending as a practical means of capitalizing on the outstanding positive attributes of each fibre. Due to some outstanding characteristics like bulk, dimensional stability, excellent elasticity and reduced pilling, the acrylic fibre has been a natural choice of many knitters. Further, acrylic fibre is
excellent in press retention and bulking characteristics. Acrylic also provides good crease recovery particularly at high humidities. Blending of acrylic with viscose rayon can be an attractive proposition because it gives reduction in cost and imparts texture, loft and hydrophilic properties to the blend.