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**KNOWLEDGE ALLIANCE**

ICT IN TEXTILE AND CLOTHING HIGHER EDUCATION AND BUSINESS

**Syllabus: Apparel Design and Production**

 **Course Draft: Apparel Production**

 **Total:** *30 hours*

**Sewing (3 hours)**

Definitions of stitches and seams according to international standards will be taught and different types and classifications of stitches and seams will be explained. Different types of needle and their subsequent uses will be explained. Uses of sewing thread, their sizing systems, and types will be explained.

**Sewing machines (5 hours)**

Different types of sewing machine shapes and explanations of their end-use will be explained. Moving parts of sewing machine including, needle, shaft, bobbin shaft, thread take-up lever, feed dogs, hook, bobbin case, and their mutual interaction in the stitch forming cycle will be elaborated. As a primary example, the stitch forming cycle of the lockstitch sewing machine will be discussed. Sewing machines come with various material transport systems according to sewing process requirements. They will be discussed to understand what sort of transportation system is required for particular apparel production. Various machine work aids will be discussed which are used in apparel production to simplify the sewing process. During sewing, various problems occur. Major sewing problems like needle heating, seam puckering, needle penetration force, and skipped stitches will be explained.

**Automation in Apparel production (2 hour)**

The history of automation in the sewing industry will be brought to discussion. Various automation practices in combination with sewing will be discussed which are used in mass production. It includes also automatic material transport systems during the sewing process with the help of CNC. Automatic machines which are widely used in mass production like pattern seaming machines, pocket setters, buttonholes, looping, and automatic looping will be explained. The concept of robotics in sewing and the use of multiple workstations with a single operator will also be explained.

**Welding technologies (3 hours)**

Despite sewing, other joining technologies being used in industry will be explained. The principle of welding technologies, required material properties, and important parameters will be explained. Welding technologies like ultrasonic, hot air, hot wedge, High-frequency welding will be explained to learners.

**Spreading/Cutting (3 hours)**

Preparation for the cutting with help of used Layering methods according to fabric and cutting requirements will be explained. The placement of marker via plotter or digitally developed with CAD softwares will be explained to get an understanding of efficient lay length. The use of automatic spreading technologies and effective faults recognition will be discussed. The cutting is performed also manually and with help of CNC machines. Both cutting methods will be discussed. Principles of other cutting technologies like laser, water jet, plasma will be explained. After cutting, the separation of cutting parts for the sewing production, labeling, bundling, segregation according to subsequent production system will be explained.

**Material Management (2 hour)**

The Importance of Material management for steady apparel production will be clarified. Different materials used during apparel production and their presence in terms of inventory management will be explained. The material management will include materials like fabric, interlining, trims, closures, sewing threads, and packagings. The use of inventory control systems for raw materials, work in progress, finished goods, and also maintenance and repairs of production will be elaborated.

**Work Planning (3 hours) The topic is shifted to Industrial Engineering, Quality Control and Management WP-11)**

The effective design of a sewing floor for smooth production flow will be explained. The effective use of ergonomics to take advantage of maximum human efficiency will be discussed. The concept of work in process (WIP) during the apparel production process will be clarified. The Time and motion study which is important for a smooth productin line will be discussed.

**Productions systems (4 hours)**

The requirements and understanding of mass production in apparel production will be elaborated. The use of different production systems widely used namely unit production system, progressive bundle systems, and modular production system in apparel production will be discussed. The pros and contras of each production system will be explained. The development of a reporting system to have a transparent view of production in process and transparency in the production floor will be explained. The use of reports generating system as an input of other reports like the efficiency of operations will be explained. The use of digitalization in production systems and machine efficiency will be discussed. Machine networking systems and their maintenance with modern digital tools will be explained and their importance in future apparel production will be discussed.

**Finishing (5 hours) (The topic is shifted to Finishing, Printing and Functionalization WP-12)**

Various finishing processes after sewing will be discussed. This includes the garment dry/wet processing in which various finishes are applied to the garment. The use of different pressing/finishing methods to prepare the garment for final packing will be explained. The use of various automatic garment finishers and digitalization during pressing will be explained. Final packaging methods used in mass production will be explained before the shipment of the product to customers.