

110143
110143

CALICUT UNIVERSITY
FIFTH SEMESTER B.Sc. DEGREE EXAMINATION
SEMESTER V
FCS5B08-TEXTILE SCIENCE

Time: 2.5 Hours

Maximum Marks: 80

PART A

Answer All Questions. Each Question Carries 2 Marks.

1. Man-made fibres are also made from polymers. Man-made fibres are not the same as natural fibres, such as silk, cotton and wool. There are two types of man-made fibres – synthetic fibres and regenerated fibres - Regenerated fibres are made from cellulose polymers that occur naturally in plants such as cotton, wood, hemp and flax. E.g rayon and acetate - Synthetic fibres are made only from polymers found in natural gas and the by-products of petroleum. They include nylon, acrylics etc
2. Because of its unique properties and high cost silk is primarily used in apparel and furnishes - Other factors that contribute to its popularity are its appearance, comfort and strength - Silk is extremely versatile and can be used to create a variety of fabrics from sheer chiffons, to heavy beautiful brocades and velvets - Because of silk's absorbency and it is appropriate for warm weather - Because of its low heat conductivity it is also appropriate for cold weather clothing - Silk under wears, socks and leggings are popular due to silk's soft hand, good absorbency and wicking characteristics - Silk is available in a range of apparel from one of a kind designer garments to low price discount store t-shirts - Silk blends are often used in window treatment and upholstery fabrics because of the soft luster and drape that silk contributes - The texture and drape of wild and duppioni silks make them ideal for covering ceiling and walls - Occasionally beautiful and expensive hand made rugs is made of silk - Liners for sleeping bags, blankets and bed sheets of silk feel warm, soft and luxurious - Silk has limited applications beyond apparel and furnishings - However silk is sometimes used in medical field.
3. The cotton fiber has got a bean shaped or kidney shaped cross section - It is made up of a cuticle, primary cell wall, secondary cell wall and lumen - The cuticle is a wax like film covering the primary or outer wall - The secondary wall is made up of layers of cellulose - The cellulose is composed of fibrils - Fibrils are bundles of cellulose chains that are arranged spirally - At some points the fibrils reverse their direction - These reverse spirals are important in the development of convolutions/twists which contribute to the elastic recovery and elongation of fibers - When the fiber becomes matured the fiber tube or lumen is completely filled - The lumen is the central canal through which nourishment travels during the fiber development - When the fiber matures the lumen or the central canal collapses.
4. Bicomponent Spinning - It is the technology of bringing two or more different polymers together at the spinneret hole so that each spun filament contains all the polymer components in separate parts of the cross-section.

5. Friction spinning - In this method the sliver of fibers is fed into the system and the fibers are separated and spread onto a combing or carding roll - They are removed from this roll and transported by air to the friction zone - Two cylinder rotating in the same direction pull the fibers together to form a yarn - The angle of feed into the friction rolls affects the fiber alignment - The smaller the angle, the better the fiber alignment and the more parallel the fibers will be.
6. In the spinning process there is always a fixed relation between the weight of the original quantity of fiber and length of the yarn produced from that amount of raw material-This relation indicates the thickness of the yarn-It is determined by the extent of the drawing out process and is designated by numbers, which are called the yarn count-The standard for the yarn count in cotton is 1 pound of fiber drawn out to make 840 yards of yarn-The resultant thickness or size is known as count no. 1 and it is denoted as Ne 1.
7. Picking - As the warp yarns are raised in the shedding process, the weft yarn is inserted through the shed by a carrier device called shuttle - The shuttle loom is the oldest type of weaving loom which uses a shuttle which contains a bobbin of filling or weft yarn that appears through a hole situated in the side - The shuttle is batted across the loom and during this process, a weft yarn is inserted in the shed.
8. Braids are narrow fabrics in which many yarns are interlaced lengthwise and diagonally- They have good elongation characteristics-They are very pliable, curve around edges nicely, and used primarily for trims, shoelaces, and coverings on components in industrial products like wiring and hoses for liquids like gasoline and water.
9. In knitting, a wale is a column of loops running lengthwise, corresponding to the warp of woven fabric; a course is a crosswise row of loops, corresponding to the filling.
10. As a fabric passes through various finishing processes, it becomes irregular in width - To restore its proper width, the cloth is stretched in some parts and shrunk in others - This process, called tentering, is done on a machine that grips the fabric along the selvedge with movable clips in chain form, so that it can be jerked along its length - The fabric is fastened on the tentering machine while it is moist, and steam is sprayed from underneath to aid in the stretching and shrinking - Before the fabric leaves the machine, it is dried by heating devices - The tiny holes or marks of the clips are sometimes noticeable in the selvedges of yard goods - Tentering helps to straighten the warp and filling threads and to smooth the fabric.
11. Calendering is essentially an ironing process-It presses out folds or creases in the fabric by passing it around a series of heavy, highly polished steam-heated rollers that move at different rates of speed and have varying degrees of heat-It imparts smoothness and luster, but not permanently.
12. Primitive man obtained dyes from flowers, nuts, berries and other forms of vegetable and plant life as well as from mineral and animal sources - They are no longer used in quantity by the dyeing industry, but they are still used for some native handicrafts in some countries.E.g. Madder, Henna, Saffron, Indigo, Cochineal etc.
13. Tie-dye is a hand process in which yarn or fabric is wrapped in certain areas with thread or string - The yarn or fabric is dyed and the string removed, leaving undyed areas

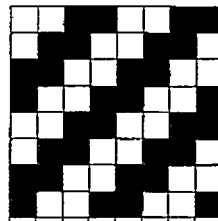
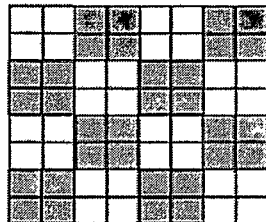
14. Eco-labels are labelling systems for food and consumer products. They are a form of sustainability measurement directed at consumers, intended to make it easy to take environmental concerns into account when shopping.
15. Organic cotton is grown without the use of toxic and persistent pesticides and synthetic fertilizers

(Ceiling marks=25 Marks)

PART B

Answer All Questions. Each Question Carries 5 Marks.

16. Visual identification – microscopic appearance – burning test – solubility test of cotton fibers.
17. **Dry Spinning** - Resin solids are dissolved by solvents - Fiber is spun into warm air - Fiber solidifies by evaporation of the solvents - Direct process - No washing etc required - E.g.- acetate, acrylic, spandex
Wet Spinning - Raw materials are dissolved by chemicals - Fiber is spun into a chemical bath - Fiber solidifies when coagulated by bath - Oldest process - Most complex - Washing, bleaching etc. required before use - E.g. acrylic, rayon, spandex
18. Sheep are generally sheared once a year in spring - The fleece is removed with power shears which looks like large barber's shears - A good shearer can handle 100-220 sheep per day - An expert can shear a sheep in less than 5 min - The fleece is removed with long, smooth strokes beginning at legs and belly - A good shearer leaves the fleece in one piece - The sheared wool is raw or grease wool - It contains impurities such as sand, dirt, grease and dried sweat which account to 30-70% of the weight of the fleece - After removing these impurities the wool is cleaned or scoured wool - The grease in its purified form (Lanolin) is valuable by product - It is used in manufacturing creams, cosmetics, soaps and ointments - The best quality fibers come from the sides, shoulders and back, the poorest wool comes from lower legs - The individual fleece is pulled apart into sections of different quality fibers and this process is called **sorting** - Fine wool is used for light weight worsted fabrics and coarse wool for carpets - The wool fibers are separated according to their fineness and length and this is known as **grading**.
19. Give the plotting for basket weave and 2/2 twill weave.



20. **Dobby weave** - Dobby weave is a patterned weave that has small geometric design - The weave is manufactured with the help of a special attachment called a dobbie head on the plain weave loom which raises and lowers certain warp yarns, so that warp and weft yarn

interlaces to create small geometric designs - It requires at least 16 harnesses and can control up to 32 harnesses - The fabric has decorative designs and a textured surface - The fabric is durable - It is used as shirting material and for making neckties.

Leno weave is a weave in which the warp yarns do not lie parallel to each other - Warp yarns work in groups, usually pairs of two; one yarn of each pair is crossed over the other before the weft yarn is inserted - Leno is made with an attachment that may be used with a plain or a dobby loom - When looking at a leno fabric, one might think that the yarns were twisted fully around each other, but this is not true - Careful examination shows that they are crossed and that one yarn of the pair is always above the other - It gives an open mesh effect on the fabric - It makes up a durable fabric because of the style of interlacement - It is used for apparel and upholstery and as a packing material for fruits and vegetables - It is also used for making mosquito nets and agro textiles to shade delicate plants.

21. a) **bird's eye weave** - it has a small diamond shaped filling float design with a dot in the centre that resembles the eye of a bird.
22. b) **double cloth** - Double-cloth fabrics have a different appearance on the two sides due to the fabrication method - These fabrics tend to be heavier and have more body than single cloths - Double cloth is made from three or more sets of yarns.
23. **Batik** is generally a hand process in which hot wax is applied to a fabric in the form of a design - When the wax has set or hardened, the fabric is piece dyed - The wax prevents penetration of dye into the wax-covered portion - Colors are built up by piece dyeing light colors first, waxing new portions, and redyeing until the design is complete - The wax is later removed by a solvent.

Rayon - Rayon fibers are highly absorbent, soft, comfortable, easy to dye and versatile - Fabrics of rayon have a unique soft drape. Rayon has an attractive, soft fluid drape - Sizing may be added to increase the body and hand - Rayon is a weak fiber that loses about 50% of its strength when wet - The breaking tenacity is 1.0 to 2.5 g/d - Rayon has a breaking elongation of 8-14% when dried and 20% when wet - It has the lowest elastic recovery of any fiber - They are absorbent having a moisture regain of 1.5 to 12.5% - Thermal retention is low - The resiliency of rayon is low - The dimensional stability is also low - The fabrics may shrink or stretch - The fiber is very weak when wet and has low elastic recovery.

Acetate - Acetate has been promoted as the beauty fiber - It is widely used in satins, brocades and taffeta in which luster, body and beauty of the fabric are more important than durability or ease of care - Acetate keeps a good white colour - This is one of its advantages over silk which yellows readily - Acetate is a weak fiber having a breaking tenacity of 1.2 – 1.4 g/d - It has a breaking elongation of 25% - It also has poor resistance to abrasion - Acetate has a moisture regain of 6.3 to 6.5% - The fiber is soft and has no allergic potential - Thermal retention is low - Acetate fabrics are not very resilient and wrinkle during use - When washed, fabrics develop wrinkle that are difficult to remove - Acetate has moderate dimensional stability - The fibers are weaker when wet and can be shrunk by excess heat - Elastic recovery is low i.e. 58%.

(Ceiling marks=35Marks)

PART C

Answer Any 2 Questions. Each Question Carries 10 Marks.

24. Various spinning processes - cotton ring spinning , open end, wet spinning, dry spinning, melt spinning, bi component spinning, bi constituent spinning, friction spinning, twistless spinning.
25. Fiber – Natural and manufactured, Natural – Cellulosic, Proteinic and mineral, Cellulosic fibers– Seed fibers (cotton, coir, kapok), Bast fibers(flax, jute etc.), Leaf fibers (pina, abaca), Proteinic fibers – Wool, Silk, Mineral fibers – Asbestos.
26. Manufactured fibers – Regenerated fibers(rayon, acetate), Synthetic Fibers (nylon, polyester, and acrylic)
27. Singeing-scouring-bleaching-mercerization-calendering-sizing-desizing-brushing carbonizing-crabbing- fulling-heat setting-shearing- weighting-tentering-napping.
28. Natural Dyes - Artificial Dyes - Acid Dyes - Basic Dyes - Direct Dyes - Sulphur Dyes - Vat Dyes - Naphthol or Azoic Dyes - Acetate Or Disperse Dyes - Reactive Dyes

(Ceiling marks=20 Marks)