

Roll No.

Total Pages : 6

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BT-6/M-24

THEORY OF TEXTILE STRUCTURE

Paper-PCC-TEX-308-A

Time : Three Hours]

[Maximum Marks : 75

Note : Unit-A (Question No.1) is compulsory. Answer any one question from each of the remaining four units. All questions carry equal marks.

Compulsory Question

1. (i) The diameter of an ideal helical yarn is not affected by :
- (a) Fiber Density
 - (b) Fiber length
 - (c) Yarn linear density
 - (d) Yarn twist.
- (ii) The packing coefficient of 20 denier polyester filament is :
- (a) 0
 - (b) 1
 - (c) 0.5
 - (d) None of the above.
- (iii) What is the twist contraction value of a zero twisted yarn?
- (a) 0
 - (b) 1
 - (c) ∞
 - (d) None of the above.

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23/6

- (iv) Which type of packing provides more yarn density at 9th layer?
- (a) Close or Hexagonal
 - (b) Open
 - (c) Random packed
 - (d) None of the above.
- (v) The tightness factor of a weft knitted fabric does not depend upon :
- (a) Loop length
 - (b) Yarn linear density (Tex)
 - (c) Yarn twist
 - (d) None of these.
- (vi) If the twist is increased twice, the diameter will
- (a) Increase by 2 times
 - (b) Decrease by 2 times
 - (c) No change
 - (d) None of the above.
- (vii) Mean fiber position of a zero twisted yarn will be :
- (a) is equal to the diameter of the yarn
 - (b) is equal to the radius of the yarn
 - (c) is twice of the diameter of the yarn
 - (d) None of the above.
- (viii) Which of the following yarn structures have the best migration phenomenon?
- (a) Ring spun yarns
 - (b) Rotor yarns
 - (c) Airjet yarns
 - (d) None of the above.

(ix) Maximum extension of a filament during tensile loading is observed at :

- (a) The filament is at 0°
- (b) The filament is at 20°
- (c) The filament is at 30°
- (d) The filament is at 40° .

(x) The stitch density of a weft knitted fabric does depend upon :

- (a) Courses per inch
- (b) Wales per inch
- (c) Yarn twist
- (d) None of the above.

(xi) The tenacity of a yarn is expressed in :

- (a) Grams
- (b) Newton
- (c) Gram/Tex
- (d) None of the above.

(xii) Which of the following weave structures having maximum crimp :

- (a) 1/1 Plain woven
- (b) 3/1 twill
- (c) 4 end satin
- (d) 4/2 twill.

(xiii) The theoretical maximum value of fabric cover in % of a square jammed plain woven fabric as per Pierce's theory is

- (a) 11
- (b) 21
- (c) 81
- (d) None of the above.

(xiv) Minimum EPI is possible for (all other parameters are same) :

- (a) 1/1 Plain
- (b) 2/1 Twill
- (c) 3/1 Twill
- (d) 4/1 Twill.

(xv) Calculate the crimp in a square non-jammed fabric if the thread spacing is half to the yarn diameter

- (a) $\frac{3}{4}$
- (b) $\frac{3}{5}$
- (c) $\frac{3}{6}$
- (d) None of the above.

(15×1=15)

UNIT-I

2. (a) Discuss the concept of limit of twist. Derive a theoretical maximum value of the surface twist angle. (12)
- (b) Define the term twist contraction factor and its significance. (3)

3. (a) An open packed ideal helical yarn consists of 7 layers. Then find out the number of fibers in each layer, total number of fibers in the yarn, packing coefficient of the yarn and the radius of the yarn. (10)
- (b) Discuss the different parameters which make the closed packed form differ from real yarns. (5)

UNIT-II

4. (a) Discuss the various parameters which affects the nature of breakages for continuous filaments. (5)
- (b) Derive a suitable expression for the modulus of continuous filament under small strain assuming only tensile force is acting on the structure. (10)
5. (a) Why migration occurs? Discuss the effect of fiber parameters on the fiber migration behavior. (5)
- (b) Discuss the various characterization techniques used for the evaluation of fiber migration behavior. (10)

UNIT-III

6. (a) Derive the following expression (standard symbols are used)
- $$\theta_1 = \sqrt{2C_1} \text{ and } h_1 = \frac{4}{3} p_2 \sqrt{C_1}. \quad (10)$$
- (b) Calculate crimp, fabric mass, fabric thickness and fabric cover factor of a square plain weave cotton fabric having woven from 30 Ne yarn. It has 70 ends and picks per inch. (5)

7. (a) Define fabric cover factor and derive a general expression for a 1/1 plain cotton fabric. Discuss the significance of fabric cover factor. Find out the theoretical maximum cover factor for 1/1 plain cotton fabric. (10)
- (b) Discuss the phenomenon of crimp interchange. Also derive a suitable expression for crimp interchange equation using Pierce's 1/1 fabric geometrical model. (5)

UNIT-IV

8. (a) Discuss the typical Load-Elongation curve of a cotton woven fabric. (5)
- (b) Derive an expression for the modulus of a Plain-woven fabric using Pierce's theory. (10)
9. (a) Differentiate between simple shear and pure shear. (5)
- (b) Discuss the concept of fabric handle. Also explain the method used for the evaluation of Total Hand Value. (10)