

Roll No. ....

Printed Pages : 3

**36074****BT-6 / M-18****THEORY OF TEXTILE STRUCTURE****Paper-TT-302-A***Time allowed : 3 hours]**[Maximum marks : 100**Note:- Attempt any five questions in all, selecting at least one question from each unit. All questions carry equal marks.***Unit-I**

1. (a) Derive a suitable mathematical expression for twist retraction factor of an ideal helical yarn. Also determine the maximum twist retraction factor for an ideal helical yarn. 14
- (b) Determine the initial count of a cotton yarn if the final English count of the yarn is 40 and the number of turns per centimetre is 7.8. 6
2. (a) A closed 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) Draw with a neat figure a hexagonal closed packed yarn having 4 cores. 4
- (c) Discuss the different parameters which make the closed packed form to differ from real yarns. 6

**Unit-II**

3. (a) Discuss the geometrical explanation of fibre migration in a yarn. Also discuss effect of various fibre parameters on migration behaviour. 10

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- (b) Explain the different experimental methodology used for the evaluation of migration. Also describe the different parameters used to characterize the migration phenomenon. 10
4. (a) What is the significance of migration? Also describe the mathematical conditions and the methodology used for the explanation of fibre migration in a seven ply structure. 12
- (b) Explain the different parameters which affect migration. 8

**Unit-III**

5. Discuss the significance of Hamburger's model for the prediction of blend yarn strength. Also explain the graphical method for the analysis of blend percentage alternations in strength. 20
6. (a) Discuss the different parameters that affect the tensile strength for a spun yarn. Also derive an expression of modulus of the yarn under small strain. 10
- (b) The strain to break a multifilament yarn is 4. The twist angle before and after the deformation is  $50^\circ$  and  $40^\circ$  respectively. If the yarn has observed a lateral strain then find the percentage of lateral strain. 12

**Unit-IV**

7. (a) How the Kemp's race track model is different from Pierce's fabric geometrical model? Derive the various equations from Kemp's model for the understanding of the fabric geometry. 12

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- (b) A woven fabric is made from 45 tex cotton yarn in warp and weft. The ends and picks per cm are 20 and 24 and the warp crimp and weft crimp are 7% and 12%. Calculate the fabric thickness assuming the flattening index = 1.3. Also determine the major and minor diameter of the yarn. 8
8. (a) A cotton fabric is made of 24 ends and 18 picks per cm, percentage of crimp in warp and weft are 10 and 5, warp and weft tex are 50 and 60. Calculate the fabric GSM, fabric specific volume and fabric cover factor assuming the packing coefficient of yarn is 0.65. 8
- (b) Discuss the significance of Ashenhurt's set theory and also compare the Ashenhurt's set theory with the Peirce's 1/1 plain fabric geometrical model for a square jammed fabric. 12

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