KUMARAGURU
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Register Number:……..…

M.TECH DEGREE EXAMINATIONS: JAN 2015

(Regulation 2014)

First Semester

TEXTILE TECHNOLOGY

P14TXT103**:** Structural Mechanics of Fabrics

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Based on pierce model of woven fabric, the approximate value of crimp height to thread spacing ratio (h/p) can be given by [K_3]

   a) 1.33 x crimp in yarn
   b) 1.33 x (crimp in yarn)$^{1/2}$
   c) 0.75 x crimp in yarn
   d) 0.75 x (crimp in yarn)$^{1/2}$

2. Choose the correct statement(s) [K_4]

   In peirce's geometrical model

   1. It is possible to have infinitely variable geometry
   2. It is possible to have two geometries
   3. It is possible to have single geometry
   4. It is possible to use 11 parameters

   a) 1,2
   b) 1,3
   c) 1,4
   d) 2,3

3. Initial modulus of a plain woven fabric can be predicted from [K_4]

   a) Yarn bending rigidity, pick spacing and crimp
   b) Yarn bending rigidity and pick spacing
   c) Yarn bending rigidity and crimp
   d) Pick spacing and crimp

4. Match the elements of **Group I** and **Group II** [K_4]

Group I	**Group II**
A. Tensile work	1. LT
B. Tensile Elongation	2. WT
C. Linearity	3. RT
D. Tensile Resilience	4. EMT

a) A-1; B-2; C-3; D-4 b) A-2; B-4; C-3; D-1

c) A-1; B-4; C-3; D-2 d) A-2; B-4; C-1; D-3

5. Bending rigidity of fabrics is related to young's modulus by the following relationship [K_4]

a) B= E I b) $B=E^2 I$

c) $B=E I^2$ d) $B=E^2 I^2$

6. The unit of bending rigidity of fabric is [K_2]

a) mN. mm b) $mN. mm^2$

c) mN / mm d) mN / mm^2

7. Choose the correct ascending sequence of the woven fabric drape coefficient % from the following [K_3]

1. Very limp – very stiff – open weave – resin treated
2. Very limp – open weave – very stiff – resin treated
3. Very limp – resin treated – open weave – very stiff
4. Very limp – open weave – resin treated – very stiff

a) 1 b) 2

c) 3 d) 4

8. To avoid premature buckling during shear test on fabric [K_4]

a) Compressive force is applied b) Tensile force is applied

c) Thicker sample is employed d) Smaller sample is employed

9. Consider the following A**ssertion [A]** and **Reason [R]** [K_4]

[A] Changes of dimension after knitting can create major problems in garments and fabrics

[R] Satisfactory relaxation technique is used to control the dimension changes

a) **[A]** is right **[R]** is wrong
b) **[A]** is right **[R]** is right
c) **[A]** is wrong **[R]** is right
d) **[A]** is wrong **[R]** is wrong

10. Spirality occurs in knitted fabric due to [K_2]

a) Unevenness in yarn
b) Residual torque in yarn
c) Hariness in yarn
d) Objectionable fault in yarn

PART B (10 x 2 = 20 Marks)

11. Point out the assumptions imposed in the analysis of Oloffson's model. [K_4]
12. Calculate the mean diameter of the yarn, if $h_1 = 7.31$ mils and $h_2 = 7.8$ mils and sum of the two minor diameters of the yarn cross-sections are 15.11 mils, and geometrical mean diameter of the yarn is 10.4 mils. [K_4]
13. Comply the various principle followed while modeling the tensile load curve. [K_5]
14. Critically analyze the importance of poisson's ratio during extension of cloth. [K_4]
15. Draw the typical bending curve of woven fabric. [K_2]
16. From the polar diagram analysis, Cooper's model is the most reliable in the prediction of bending hysteresis than other model. Justify. [K_4]
17. State pure shear strain. [K_1]
18. Relate the fabric drape and mechanical properties. [K_4]
19. Point out the assumptions imposed in the geometrical analysis of plain knitted structure. [K_4]
20. Critically analyze the effect of twist on spirality of knitted fabric. [K_4]

PART C (6 x 5 = 30 Marks)

21. Derive on expression for Grosberg's fractional cover for woven fabrics. [K_4]

22. Explain the finite element approach in fabric tensile behaviour analysis. [K_4]

23. Explain the theory of fabric bending. [K_4]

24. Critically examine the relationship between shear and bending deformation of fabric. [K_4]

25. Summarize the theoretical justification of loop model according to munden. [K_5]

26. Explain the polar diagram of bending model. [K_4]

PART D (4 x 10 = 40 Marks)

27. Using pierce's plain cloth geometry, derive the relationship between thread displacements, crimp and pick spacing. [K_5]

28. Predict the anisotropy tensile properties of woven fabric with the help of modeling. [K_5]

29. Summarize the two dimensional and three dimensional drape of plain and twill woven fabrics. [K_4]

30. Explain the effect of dimensional properties on spirality of knitted fabrics. [K_4]

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