**15124**

**B. Tech 4th Semester Examination**

**Properties of Fibre (OS)**

**TE-4001**

Time : 3 Hours                               Max. Marks : 100

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** The question paper consists of five sections A, B, C, D and E. The candidates are required to attempt five questions in all selecting one question from each of section A, B, C, D, and all the subparts of the questions in Section E.

### SECTION - A

1.  (a)  Explain the X-ray diffraction techniques in the application of investigating the properties of textile materials.   (10)

    (b)  Compare the methods to measure crystallinity.   (10)

2.  (a)  Explain briefly the important parameters to characterize the most important features of fibre structure.   (8)

    (b)  Write a short note on modified fringed micellar theory.   (6)

    (c)  How can you measure crystallinity in fibres by IR spectroscopy method?   (6)

### SECTION - B

3.  (a)  Show graphically the relation between regain and RH for various textile materials.   (5)

    (b)  Define heat of sorption. How can you measure it?   (10)

**[P.T.O.]**

    (c)  Discuss the effect of stress and temperature on regain.   (5)

4.  (a)  Describe the Peirce's two phase theory to draw relation between regain and relative humidity taking consideration of directly and indirectly attached water molecules.   (10)

    (b)  It is found that for a viscose rayon fibre (13% standard regain) after moisture absorption 2% density reduction takes place. If its transverse diameter swelling is 5%, calculate its axial or longitudinal swelling (assume circular cross section).   (10)

### SECTION - C

5.  (a)  Explain creep, stress-relaxation and mechanical conditioning from molecular point of view.   (7)

    (b)  What extent can we explain viscoelasticity in fibres by Voigt-Kelvin model?   (8)

    (c)  Discuss the factors influencing the load elongation tests.   (5)

6.  (a)  What is the importance of 'toughness' and initial modulus in textile fibre?   (5)

    (b)  Explain stress-strain behavior of textile material from molecular point of view.   (5)

    (c)  What is generalized creep curve and how is it drawn?   (10)

### SECTION - D

7.  (a)  "Higher the speed of a process in Textile Industry higher the static charge generated" - explain.   (5)

    (b)  What are the disadvantages of static generation in textile materials?   (5)

(c)    How the dielectric property of fibre is measured?    (10)

8.   (a)    Define permittivity & dielectric constant.    (4)

(b)    Which factors affect the dielectric properties of fibre and how?    (8)

(c)    Explain a method to measure the static charge generated in textile material.    (8)

## SECTION - E
### (All question are compulsory)

9.   (a)    Why Ramie have a higher birefringence than that of cotton?

(b)    Define mass specific resistance.

(c)    What is the effect of friction on feel of a fabric?

(d)    What is the difference between relaxation modulus and creep modulus?

(e)    Why Glass transition temperature ($T_g$) is known as second order transition?

(f)    "Any thermal transition causes a setting effect in fibres" Explain?

(g)    How can you measure static charge in card sliver?

(h)    What is primary & secondary creep?

(i)    What are the conditions to happen Dichorism?

(j)    "Fibres have negative thermal expansion coefficient" - explain.    (10×2=20)