07/12/2018 (M)

Roll No. ..... Total Pages : 05

BT-5/D-18 35142

STRUCTURE AND PROPERTIES OF FIBRES

TT-301-N

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all including Q. No. **1** which is compulsory. Select *one* question from each Unit. All questions carry equal marks.

1. Attempt all following multiple choice questions, each question carries 1 mark :

(i) X-ray diffraction is used to find out :

(a) Refractive index

(b) Birefrignece

(c) Crystallite orientation

(d) All of the above

(ii) Birefringence value of acrylic fibre is :

(a) Zero (b) Negative

(c) Positive (d) None of these

(iii) The moisture regain of cotton fibre at 65% RH is in the range of :

(a) 2-3% (b) 7-8%

(c) 10-11% (d) 14-15%

(iv) Textile fibres behave like :

(a) Pure Elastic (b) Viscouse

(c) Visco-elastic (d) All of these

(v) Maxwell model describe the phenomenon of :

(a) Thermal expansion

(b) Fringed miceller model

(c) Glass transition theory

(d) Visco-elasticity

(vi) Cellulose is made up of :

(a) C,H,O (b) C,H,N

(c) C,H,COOH (d) C,N,COOH

(vii) Strength of which fibre reduces under wet condition :

(a) Cotton (b) Polyester

(c) Nylon (d) None of these

(viii) Find the odd one out :

(a) Tenacity (b) Yield point

(c) Work of rupture (d) Crystallinity

(ix) Which equation shows the right relation between Transverse Area Swelling (S_A) and Transverse Diameter Swelling (S_D) for a cotton fibre :

(a) $S_A = 2S_D + S_D^2$ (b) $S_D = 2S_A + S_D^2$

(c) $S_D = 2S_D + S_A^2$ (d) None of these

(x) Find the odd one out :

(a) Strain (b) Elonagation

(c) Extension (d) Yield point

(xi) Find the right equation for yarn friction passing over a guide :

(a) $T_2/T_1 = e^{\mu\theta}$ (b) $T_2/T_1 = e^{T\theta}$

(c) $T_2/\mu\theta = T_1e^{\theta}$ (d) $\mu\theta = e^{T_2/T_1}$

(xii) Find the odd one out :

(a) X-ray (b) SEM

(c) IR-spectroscopy (d) Radio wave

(xiii) A good fibre forming polymer should not have :

(a) Linear polymeric chain

(b) Branched polymeric chain

(c) High DP

(d) High inter molecular interaction

(xiv) When the fibre molecules are arranged in random then it is :

(a) High orientation (b) Low orientation

(c) Crystalline (d) Amorphous

(xv) Find the odd one out : 1×15=15

(a) Hook's law (b) Elasticity

(c) Resiliency (d) Amorphous

Unit I

2. (a) Explain fine structure models proposed to describe fibre morphology. 8

(b) Explain the application of X-ray techniques in textiles. 7

3. (a) Describe the physical and chemical structure of cotton and polyester fibre. **10**

(b) Write a short note on folded chain crystal model. **5**

Unit II

4. (a) Define and discuss the significance of the following terms related to mechanical properties of fibres :

(i) yield point (ii) work of rupture

(iii) initial modulus (iv) elastic recovery

(b) Explain creep and stress relaxation for elastic, viscous and viscoelastic material with suitable diagrams. **7**

5. (a) Discuss different theories put forward to explain the frictional behaviour of textile materials. **10**

(b) Discuss the method to measure fibre friction by static method. **5**

Unit III

6. (a) Describe the theory of quantitative analysis of moisture adsorption in cotton. **8**

(b) Explain the principle and experimental set up for measurement of birefingence. **7**

7. (a) What is hysteresis ? Discuss the relation between moisture regain and relative humidity. 5

(b) Discuss in general the diffusion theory of moisture absorption in fibres. 5

(c) Define refractive index and optical birefringence. What is the relation between birefringence and orientation in fibres ? 5

Unit IV

8. (a) Describe molecular motion and transition phenomenon on heating. 5

(b) Explain thermal expansion behaviour of fibres with necessary derivations. 5

(c) Why melting is called a first order transition and glass transition is known as second order transition. 5

9. (a) Describe the dielectric effects in the materials. 5

(b) What are the factors that influence the electrical resistance of textile materials ? 5

(c) Describe the methods to minimize static generation in textiles. 5