B.TECH. DEGREE EXAMINATIONS: APRIL / MAY 2009

Third Semester

TEXTILE TECHNOLOGY

U07TT303 Structure and Properties of Fibres

Time: Three Hours

Maximum Marks: 100

Answer ALL the Questions:-

PART A (20 x 1 = 20 Marks)

1. Which one of the following fibres is an example for fringed micellar model?

   A. Nylon   B. PET   C. Wool   D. Viscose rayon

2. Which one of the following can not be measured using X ray?
   A. Degree of crystallinity   B. Crystalline orientation
   C. Average orientation   D. Crystallite size

3. In electron microscopy, relationship between wavelength of rays (λ), accelerating voltage (V) is

   A. $\lambda \, \alpha \, V^{-1/2}$ B. $\lambda \, \alpha \, V^{1/2}$ C. $\lambda \, \alpha \, 1/V^{-1/2}$ D. $\lambda \, \alpha \, V$

4. Crystalline structure of native cellulose is known as

   A. Cellulose X   B. Cellulose I   C. Cellulose II   D. Cellulose III

5. Which one of following statements is true?

   A. Moisture regain increases with amorphous regions present in the fibres
   B. Moisture regain increases with functional groups present in the fibres
   C. Moisture regain increases with functional groups, amorphous regions present in the fibres.
   D. Moisture regain is independent of amorphous region and functional groups.

6. Which one of the following does not influence conditioning of textile materials?

   A. Vapour pressure   B. Temperature   C. Regain   D. Degree of polymerization

7. Which one of the following factors influences the diffusion process?

   A. Velocity of diffusant   B. Concentration gradient
   C. Amorphous region   D. Pressure

8. With reference to increasing order of moisture regain, which one of following is correct?

   A. Raw cotton < Scoured cotton < Mercerised cotton < Viscose rayon

   B. Mercerised cotton < Scoured cotton < Raw cotton < Viscose rayon

   C. Viscose rayon < Raw cotton < Mercerized cotton < Scoured cotton

   D. Scoured cotton < Raw cotton < Mercerized cotton < Viscose rayon

9. Stress =
   A. Load / Area of Cross Section   B. Load / Mass per unit length
   C. Elongation / Initial Length   D. Force x displacement

10. Which one is not the unit of specific work of rupture?
    A. N.m / kg   B. J/kg   C. kJ/g   D. kJ

11. Which factor distinguishes the CRL and CRE testers?
    A. Creep   B. Stress relaxation   C. Initial Modulus   D. Time

12. Elastic recovery, at high extension, is higher for
    A. Wool   B. Nylon   C. Silk   D. Cotton

13. Birefringence of a fibre is =

    A. Difference between two principal refractive indices

    B. Ratio of two principal refractive indices

    C. Sum of two principal refractive indices

    D. Any of the two principal refractive indices

14. Which one of the following fibres has negative birefringence?

    A. Cotton   B. Glass   C. Acrilan acrylic   D. Silk

15. Extremely low co-efficient of friction is observed in

    A. Glass   B. Wool   C. Nylon   D. Teflon

16. Which one of the following is true with reference to friction?

    A. As the contact angle increases the tension increases at the delivery
    B. As the contact angle increases the tension decreases at the delivery
    C. As the contact angle increases the tension increases and then decreases
    D. As the surface area increases the tension decreases

17. With respect to dielectric properties of fibres, which one of the following statement is true?
    A. Influence of frequency and moisture are same on dielectric properties of t polymers.
    B. Influence of frequency and temperature are same on dielectric properties of t polymers.
    C. Influence of frequency and impurities are same on dielectric properties of t polymers.
    D. Dielectric properties of bound water and free water are same.

18. Electrical circuits with null deflection method is used to measure ---

    A. Very low resistance   B. Low resistance
    C. High resistance   D. Very high resistance

19. Melting point of nylon 6, 6 is --- ° C

    A. 210   B. 260   C. 350   D. 180

20. Multiple first order transitions are observed in ----

A. Nylon   B. Wool   C. Silk   D. Viscose

PART B (5 x 16 = 80 Marks)

21. (a) (i) Explain the physical structure of cotton fibre with suitable diagrams.   (8)

(ii) Compare various features of fringed micellar model and fringed fibrillar model with suitable examples.   (8)

(OR)

21. (b) (i) Explain the principle and working of electron microscope and its applications in fibre analysis.   (8)

(ii) Explain the principles, applications of X-ray diffraction in analyzing fibre morphology   (8)

22. (a) (i) Define: Moisture regain, heat of wetting, differential heat of sorption and Fick's law of diffusion   (2+2+2+2)

(ii) Explain the method of measurement of integral and differential heat of sorption.   (8)

(OR)

22. (b) (i) Expalin conditioning process in terms of regain, temperature and vapour pressure.   (8)

(ii) Explain the relationship between RH and regain of various fibres with factors influencing the relationship.   (8)

23. (a) (i) Explain various mechanical conditioning of fibres and its influence on fibre properties.   (8)

(ii) Explain various methods of identifying yield point in a stress-strain curve. (8)

(OR)

23. (b) (i) Explain the influence of fibre structure, humidity and temperature on stress-strain characteristics of textile fibres.   (8)

(ii) Explain the limitations of conventional testing and list the methods of dynamic testing.   (8)

24. (a) (i) Explain various methods of measuring refractive index of fibres with the significance. (8)

(ii) Compare the birefringence values of different fibres with justification. (8)

(OR)

24. (b) (i) Explain the method of measuring friction in fibres. (8)

(ii) Explain the directional frictional effect in wool and derive the equation of the force required to slippage to occur between wool fibres. (8)

25. (a) (i) Discuss various methods employed for measuring dielectric constant and explain various factors that influence the dielectric properties of fibres. (8)

(ii) With suitable diagram discuss various methods of measuring electrical resistance of fibres. (8)

(OR)

25. (b) (i) Distinguish between first order, second order and secondary thermal transitions with neat sketch. (8)

(ii) Explain heat setting process in terms of structural changes of the fibres. (8)

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   d) S

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