# M.TECH DEGREE EXAMINATIONS: DECEMBER - 2008

First Semester

## TEXTILE TECHNOLOGY

P07TX101 Theory of Textile Fibres

**Maximum Marks: 100**

**Time: Three Hours**

**Answer ALL Questions:-**

## PART A (20 × 1 = 20 marks)

1. Cross-sectional view of cotton is

   A. Kidney shaped    B. Round    C. Oval    D. Irregular

2. Cross-sectional view of degummed silk is

   A. Triangular    B. Round    C. Bean shaped    D. Irregular

3. Which of the fibre is highly crystalline?

   A. Viscose Rayon    B. Wool    C. Silk    D. Cotton

4. The molecular weight of a fibre forming polymer molecule is

   A. 1500    B. 150    C. 15000    D. 150000

5. X-ray diffractometer is used for measuring

   A. Crystallinity    B. Melting Point    C. Functional groups    D. Density

6. Optical and electron microscope is used for studying

   A. Crystallinity    B. Melting Point    C. Functional groups    D. Surface morphology

7. IR spectroscope is used for measuring

   A. Crystallinity    B. Melting Point    C. Functional groups    D. Surface morphology

8. Nanopores on the fibre surface can be measured by

   A. Scanning electron microscope    B. Optical microscope
   C. Atomic force microscope    D. IR Spectroscopy

9. The strength of a manufactured fibre increases with

   A. Crystallinity    B. Orientation    C. Molecular weight    D. Molecular weight and Orientation

10. Which of the following fibres has maximum elastic recovery?

    A. Cotton    B. Polyester    C. Nylon    D. Kevlar

11. Creep is

    A. Slow deformation                B. Sudden rupture of fibre
    C. Tensile strength                 D. Elastic recovery

12. Which of the following fibre will show highest work of rupture?

    A. High strength and low elongation    B. High elongation
    C. High Crystallinity                  D. High strength and high elongation

13. If D = Oven dry weight of a fibre, W = Weight of water present in the fibre, R = Moisture regain of the fibre, M = Moisture content of the fibre, which of the following is not correct?

    A. $R = (100W) / D$                 B. $M = (100W) / (D+W)$
    C. $R = M / \{1 + (M / 100)\}$       D. $M = R / \{1 + (R/100)\}$

14. Which of the following fibres show highest heats of wetting from zero regain?

    A. Polyester        B. Nylon      C. Mercerized cotton      D. Viscose rayon

15. Electrical resistance of a fibre with increase in moisture content.

    A. Increases linearly      B. Increases exponentially    C. Decreases  D. Remains constant

16. For a given moisture regain the relative permittivity of a fibre with temperature

    A. Decreases linearly      B. Decreases exponentially   C. Increases   D. Remains constant

17. Which of the following fibre is preferred for fire fighting clothes?

    A. Kevlar         B. UHMWPE       C. Dyneema        D. Nomex

18. Strength of Kevlar fibre is

    A. 50 gpd      B. 5 gpd         C. 25 gpd         D. 2.5 gpd

19. Precursor for making carbon fibre is

    A. Silk        B. Wool         C. Ramie         D. Acrylonitrile

20. The fibre molecule in the glass fibre is aligned along

    A. Fibre axis                 B. Perpendicular to fibre axis
    C. Diagonally                D. In all directions

## PART B (5 × 16 = 80 marks)

21. (a) Discuss in detail the effect of various parameters upon the fine and morphological structures of fibre?             (16)

### (OR)

21. (b) With neat sketches explain the fine and morphological structure of various fibres and highlight the influence of such structures on the individual fibre properties.    (16)

22. (a) (i) With the schematic diagram explain the principle of operation of electron microscope. (8)

(ii) With the schematic diagram explain the principle of operation of X-ray diffractometer. (8)

**(OR)**

22. (b) (i) With the schematic diagram explain the principle of operation of IR spectroscope. (8)

(ii) With the schematic diagram explain the principle of operation of Atomic Force Microscope. (8)

23. (a) (i) Discuss in detail the effect of crystallinity, orientation, polymer molecular weight upon the mechanical properties of a manufactured fibre? (10)

(ii) With the neat sketch explain the various stages of deformations of a textile fibre under tensile loading. (6)

**(OR)**

23. (b) (i) Explain in detail, with suitable diagrams, the time and temperature dependence of mechanical properties of manufactured fibres and natural fibres. (12)

(ii) Draw the stress strain curves of all the textile fibres (4)

24. (a) (i) Explain the conditioning of textile fibres illustrating the relationship between the moisture regain and relative humidity. (12)

(ii) Draw the diagram illustrating the change in regain, temperature, and vapour pressure during conditioning. (4)

**(OR)**

24. (b) (i) With the neat sketch explain the principle of measurement of electrical resistance of textile fibres. (8)

(ii) Discuss in detail the various factors that influence the dielectric properties of textile fibres. (8)

25. (a) Highlighting the fine and morphological structures, compare and contrast the properties of high strength and high modulus fibres with the conventional fibres. (16)

**(OR)**

25. (b) Discuss in detail the various high tech applications of glass and carbon fibres highlighting the specific fibre properties. (16)

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