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Register Number:………….…

Ph.D COURSE WORK EXAMINATIONS: JUNE 2017

(Regulation 2015)

TEXTILE TECHNOLOGY

P15TXTE02 : Characterization of Textile Polymers

COURSE OUTCOMES

CO1:   Characterize the molecular weight of a polymer

CO2:   Describe the molecular structure characterization of polymer

CO3:   Explain the thermal characterization of polymer

CO4:   Describe the other structure characterization of polymer

CO5:   Interpret data obtained from various analytical instruments

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1.   Consider the following assertion [A] and reason [R] and choose the most appropriate   CO1   [K4]
     answer.

     Assertion (A): Osmometry- osmotic pressure of the solvent across the semi permeable

     membrane is measured by the membrane osmometer

     Reason (R): Solute cannot cross the semi-permeable membrane but the solvent is able

     to cross the membrane.

     a)   [A] is right [R] is wrong   b)   [A] is right[R] is right

     c)   [A] is wrong [R] is wrong   d)   [A] is wrong [R] is right

2.   Number average molecular weight can be evaluated using dilute solution of a polymer   CO1   [K1]
     making use of----------

     (a)   Ebulliometric (boiling point elevation)   b)   Cryoscopic (freezing point depression)

     (c)   Osmometric (membrane osmometry)   d)   UV-visible

3.   In NMR spectroscopy , Intermolecular magnetic field around an atom in a molecule   CO2   [K1]
     changes the -----

     a)   resonance frequency   b)   osmotic pressure

     c)   pores in the gels   d)   molar absorptivity

4. Matching type item with multiple choice code   CO3   [K4]

List I	List II
A- Thermo Mechnaical Analysis	i. magnetic field,
B-Osmomerty	ii. ionizes chemical species and sorts the ions
C- Thermo Gravimetric Analysis	iii. molar absorptivity
D- Mass spectrometry (MS)	iv. Semi permeable membrane.

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	ii	iv

5. Consider the following assertion [A] and reason [R] and choose the most appropriate   CO2   [K4]
answer.

Assertion (A): Fourier transform infrared (FTIR) spectroscopy is a measurement technique allows infrared spectra

Reason (R): Infrared light guided through an interferometer and then through the sample

a) Both A and R are Individually true and R is the correct explanation of A

b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

6. The Raman effect is based on   CO2   [K2]

a) Inelastic scattering of a monochromatic incident radiation

b) Beam of electron passes through gas phase sample

c) E at a frequency characteristic of the isotope

d) Change in the dipole moment of the molecule

7. Multiple selection item with multiple choice code   CO3   [K3]

In Differential thermal Analysis technique

1. The heat flow to the sample and reference that remains the same rather than the temperature.

2. When the sample and reference are heated identically, phase changes.

3. Other thermal processes cause a difference in temperature between the sample and reference

a) 1,3

b) 1,4

c) 1,2

d) 2,3

8. For studying the viscoelastic behavior of polymers ---------------- is used   CO4 [K2]

    a) Dynamic mechanical analysis   b) Thermo gravimetric analysis

    c) Differential scanning calorimetry   d) SEM analysis

9. Topography of surfaces of polymer is studied by ----------   CO4 [K1]

    a) AFM   b) X-Ray Diffraction

    c) DTA   d) Optical microscopy

10. Sequencing type item   CO5 [K5]

Gel Permeation Chromatography-The Dye Partition Technique

    1. When chloroform or benzene solution of a specified amount of a polymer containing an ionizable end group is shaken with aqueous solution of a suitable ionic dye

    2. Rendering the organic layer coloured with an intensity proportional to the concentration of the appropriate ionic end group present;

    3. The dye gets partitioned into the organic layer (say, chloroform layer)

    4. With corresponding polymer having no specified ionizable end group or with the simple organic solvent containing no dissolved polymer.

    a) 2-3-4-1   b) 1-3-2-4

    c) 3-4-2-1   d) 4-1-3-2

PART B (10 x 2 = 20 Marks)

11. Define Viscosity Average Molecular Weight of a textile polymer.   CO1 [K1]

12. What is the method of measuring Number Average Molecular Weight of a polymer?   CO1 [K2]

13. Outline the principle of UV visible spectroscopy for molecule structure characterization of polymers.   CO2 [K2]

14. How the measurement of thermal characteristics of a polymer does is carried out using Differential Scanning Calorimetry?   CO3 [K_1]

15. How the heat capacity of a polymer does is measured?   CO3 [K_2]

16. List the thermal transitions of a polymer that take place on heating and name the technique being used to find the same.   CO4 [K_4]

17. Give the principle of measurement of thermal characteristics of textile polymers in TMA   CO4 [K_4]

18. Give the application of Raman Spectroscopy in Textiles in characterizing the polymers.   CO4 [K_2]

19. Give the importance of Atomic force microscopy (AFM) in characterization of polymer.   CO5 [K_3]

20. What are the different techniques used particle size AFM in characterizing the polymers of textiles?   CO5 [K_1]

PART C (6 x 5 = 30 Marks)

21. Summarize the principle of measurement of polymer molecular weight using light scattering techniques. CO1 [K2]

22. Discuss about the concept of Raman spectroscopy and it application in textile polymer characterization. CO2 [K4]

23. Explain the method of molecular structure characterization in IR spectroscopy. CO3 [K4]

24. Outline the principle of Dielectric Analysis (DEA) in measuring the thermal characteristics of polymers. CO4 [K2]

25. Explain shortly about the measurement of birefringence of textile polymers. CO5 [K4]

26. How the crystallinity of polymer is measured by density measurement? CO5 [K2]

Answer any FOUR Questions

PART D (4 x 10 = 40 Marks)

27. Explain the concept measurement of molecular weight and dimension measurement using Gel Permeation Chromatography. CO1 [K5]

28. Discuss in detail about the thermal properties of polymers using differential scanning calorimetry. CO2 [K5]

29. Explain the principle of measurement of thermal characterization of polymers by using thermo gravimetric analysis. CO3 [K5]

30. Describe the method of measurement of optical properties of polymer using Transmission Electron Microscope. CO4 [K5]

31. Describe the measurement technique of surface area and pore volume of textile polymers using B.E.T method. CO5 [K5]

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