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Question Paper Code: 53966

Ph.D COURSE WORK EXAMINATION, JUNE 2016

Elective

COURSE WORK

15PPH105 – PHYSICOCHEMICAL METHODS FOR CHARACTERIZATION OF
NANOMATERIALS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

(5 x 20 = 100 Marks)

1. (a) With Scherer formula using X-Ray powder diffraction method, how will you determine lattice parameter, structure and particle size of a given nanomaterials. (20)

Or

- (b) Explain briefly how will you analyse the structure, profile analysis and particle size of a given nanomaterial using Laue's single crystal diffraction technique. (20)
2. (a) Discuss the principle and instrumentation of Thermogravimetry analysis for nanostructured samples. (20)

Or

- (b) (i) Explain differential scanning calorimetric method to analyze the crystalline nature of a given material. (15)
- (ii) Highlight the importance of thermal analysis of nanostructures. (5)
3. (a) (i) Discuss briefly the high resolution imaging technique using High Resolution. Episcopic Microscopy. (10)

- (ii) Explain the working of Electron energy Loss Spectroscopy used in TEM to extract chemical and structural information of a nanosized particles. (10)

Or

- (b) (i) Explain X-ray characterization technique used for elemental analysis of nanomaterials using Energy Dispersive Analysis X-ray Spectroscopy. (10)

- (ii) How will you correct the errors occur during qualitative analysis study of nanomaterial sample using X-ray spectrometer. (10)

4. (a) (i) Compare Molecular spectroscopy with Atomic spectroscopy. (5)

- (ii) Discuss Raman spectroscopy and also few applications of Coherent Anti-stokes Raman Spectroscopy. (15)

Or

- (b) Discuss briefly the characterization technique using NMR spectroscopy and its applications. (20)

5. (a) (i) What is the principle behind Nanoindentation technique to study the mechanical properties of the nanomaterials? (10)

- (ii) Discuss the mechanical properties of materials in nano dimension. (10)

Or

- (b) (i) How will you perform hardness test in thin film and coatings. (10)

- (ii) Discuss how Molecular Dynamic Simulation technique used for finding mechanical interphase thickness of nanocomposite polymer electrolyte. (10)
