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**Question Paper Code: 53966**

Ph.D COURSE WORK EXAMINATION, MAY 2017

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) Principle, block diagram and working of single crystal diffraction techniques. (20)

Or

- (b) Discuss structure analysis, profile analysis and particle size analysis using Scherer formula with suitable examples. (20)

2. (a) Discuss the principle and instrumentation of Thermogravimetry analysis for nanostructured samples. (20)

Or

- (b) (i) Explain briefly the basic principle, instrumentation and applications of Thermo Gravimetric Analysis (TGA). (15)

- (ii) List out the applications of differential thermal analysis (DTA). (5)

3. (a) Discuss the principle instrumentation and applications of HRTEM and atom probe field ion microscopy. (20)

Or

- (b) (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)
4. (a) (i) Discuss about the applications of IR and EPR spectroscopy. (10)
- (ii) Discuss Raman spectroscopy and also few applications of Coherent Anti-stokes Raman Spectroscopy. (10)

Or

- (b) Discuss briefly the characterization technique using NMR spectroscopy and its applications. (20)
5. (a) (i) Give the principles of nanoindentation. (10)
- (ii) Explain the mechanical properties of materials in small dimensions. (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)
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