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Total No. of Pages : 02

Total No. of Questions : 09

M.Sc.(Physics) (2015 to 2017) (Sem.-3)

MATERIALS TESTING AND CHARACTERIZATION TECHNIQUES

Subject Code : MPH-303

Paper ID : [72616]

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. Attempt any FIVE questions, including compulsory Question No.9

- Q1. a) Discuss important parameters required to describe the material. (8)
- b) Explain briefly the basic characterization techniques required for the analysis of materials. (12)
- Q2. a) With a general diagram describe the basic principles and components of an optical microscope. (12)
- b) How stereomicroscopy is important in materials characterization? (8)
- Q3. Discuss the importance of measuring grain size, particle morphology, particle size and size distribution for the characterization of materials. (20)
- Q4. What do you mean by X-ray diffraction? Discuss the techniques in detail for the structure and particle size determination using XRD. (20)
- Q5. a) Discuss the terms 'Tensile Hardness' & 'Torsion Testing' and their significance. (12)
- b) Cite the five factors that may lead to scatter in fatigue life data. (8)
- Q6. a) What do you mean by differential scanning calorimetry? With a labeled sketch of DSC explain its working. (12)
- b) What do you mean by differential thermal analysis and how it is helpful in describing various properties of materials. (8)
- Q7. With a general diagram of Transmission electron microscope, explain the function of various components. Discuss how it can be used for characterizing the materials. (20)

Q8. Discuss in detail :

- a) Photo luminescence. (10)
- b) Scanning tunneling microscopy. (10)

Q9. Answer briefly :

- a) Why we use only x-rays to study the crystal structure of materials?
- b) Why resolving power of an electron microscope is much higher than an ordinary optical microscope?
- c) Explain the term 'Colour Metallography'.
- d) Explain the significance of creep.
- e) Explain the term 'Dilatometry'.
- f) What is the importance of microstructure determination?
- g) Which instruments are used for the identification of defects in materials?
- h) State and explain 'Bragg law'. (2.5×8)