

Roll No.

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)