



Reg. No. :

**Question Paper Code : 70819**

M.E./M.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019  
Elective  
Manufacturing Engineering  
MF5016 – MATERIALS TESTING AND CHARACTERIZATION TECHNIQUES  
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. What is the purpose of etching in materials characterisation ?
2. What is the principle of Geiger diffractometer ?
3. What is ultramicrotomy ?
4. With a neat diagram represent the electron specimen interaction.
5. When are the advantages of WDS ?
6. Draw a schematic representation showing the Auger effect.
7. What are the factors that affect the fracture toughness of any material ?
8. What is proof stress ?
9. What are the different stages of creep ?
10. What is the significance of LM parameter ?

PART – B

(5×13=65 Marks)

11. a) i) Explain in detail any two methods of determining ASTM grain size. (7)  
ii) Explain the working of a Debye Scherer camera with a neat diagram. (6)
- (OR)
- b) i) Explain the steps involved in the specimen preparation for optical microscopy. (7)  
ii) Write a note on the elements of electron diffraction. (6)

70819



12. a) i) Explain the construction and working principle of SEM. (10)  
ii) Bring out the differences between SE and BSE. (3)  
(OR)
- b) i) What is the principle of AFM ? What are its modes ? Explain its working principle and applications with examples. (10)  
ii) Distinguish between SEM and TEM. (3)
13. a) Explain the theory, working principle and construction of FTIR. What are its major applications ? (13)  
(OR)
- b) What is thermal analysis ? Compare the working of DTA, DSC and TGA. (13)
14. a) i) Draw neat diagrams of stress - strain curve for ductile and brittle material and explain engineering stress, engineering strain, true stress and true strain. Derive the relation between them. (10)  
ii) Write a brief note on microhardness. (3)  
(OR)
- b) i) Explain the Charpy and Izod tests in detail. (10)  
ii) Write a note on the need for codes and standards for testing of materials. (3)
15. a) i) Explain the rotating beam fatigue test. (7)  
ii) Draw the SN curve and explain the significance of the same. (6)  
(OR)
- b) i) Discuss in detail the procedure involved in the creep test. (7)  
ii) What are the applications of dynamic tests ? (6)

PART - C

(1×15=15 Marks)

16. a) Distinguish between the following pairs :
- i) Optical and electron microscopy
  - ii) Rockwell and vickers hardness
  - iii) Time domain and frequency domain FTIR spectra.
- (OR)
- b) Distinguish between the following pairs :
- i) HCF and LCF
  - ii) Macro etching and micro etching.
  - iii) Bright field and dark field.