

M.E. METALLURGICAL AND MATERIAL ENGINEERING FIRST YEAR FIRST SEMESTER EXAM 2024**Subject: CHARACTERIZATION OF MATERIALS****Time: 3 hours****Full Marks: 100****Answer any four (4) questions.**

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| 1 | What are the reasons for the choice of the operating voltage in the scanning electron microscope (SEM)? What are depth of Field and depth of focus? What are secondary electron and back scatter electron? | 8+8+9 |
| 2 | Differentiate: Continuous spectrum and characteristic spectrum of X Ray. What is absorption? In what way are absorptions different in the characteristic spectrum and continuous spectrum of X Ray? | 12+6+7 |
| 3 | What are the use of gun, condenser lens, objective lens and vacuum in SEM? Why is SEM used in imaging of fracture surfaces? What is working distance? What is the influence of atomic numbers of elements in the yield of back scatter electron and secondary electron? | 12+5
+2+6 |
| 4 | What is interaction volume? By what means do energy dispersive spectroscopy and wave length dispersive spectroscopy (WDS) work? What are the reasons for use of WDS in identifying light elements? | 6+12
+7 |
| 5 | By what methods do differential thermal analysis and differential scanning calorimetry work? Describe the methods to determine the solvus line in a phase diagram. | 12+
13 |
| 6 | What is reciprocal lattice? What is the use of reciprocal lattice? What is Ewald sphere construction? | 8+7+
10 |