

2063

M.E. (Mechanical Engineering) Second Semester
MME-203: Advances in Engineering Materials

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, selecting atleast two questions from each Part.

x-x-x

PART-A		
1 (a)	How can we classify the engineering materials and what are the criteria for selection of materials for engineering purpose?	5
(b)	What is the role of crystal structure and crystal defects on the performance of metals?	5
2 (a)	What do you mean by photoelectron spectroscopy? Explain the principle and instrumentation of X-ray photoelectron spectroscopy (XPS). Give applications and limitations.	5
(b)	Explain how infiltration of copper in steel and inclusion such as Cu ₂ O in tough pitch copper can be observed using Colour Metallography.	5
3 (a)	What is basic difference between SEM and TEM? With a ray diagram explain working of TEM. Discuss- Diffraction pattern in TEM.	5
(b)	What do you mean by thermal analysis? Explain thermos gravimetric analysis (TGA) technique. Discuss its applications.	5
4 (a)	Write the properties of an ideal image?	5
(b)	Explain about operating conditions of SEM and preparation of SEM specimen?	5
PART-B		
5 (a)	What are polymers? Explain the structure, properties and application of PET and EPOXY?	5
(b)	Explain Chemical Vapor Deposition technique of Carbon Nanotube synthesis?	5
6 (a)	Write eight examples of natural and artificial nano materials?	5
(b)	State the structure, raw polymer properties and application of butyl rubber	5
7 (a)	What standard are followed to perform mechanical tensile test for polymer nanocomposites? Explain.	5
(b)	Explain in detail why band gap of nanomaterials increases with size reduction.	5
8 (a)	What are smart materials? Explain its applications in various fields. Discuss the advantages of multiplexing embedded NiTiNOL actuators.	5
(b)	Explain in detail the working of Piezo-electric tactile sensors.	5

x-x-x