

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

Q1(a)	Discuss the need of advanced engineering materials and give the general classification of these materials	5
(b)	Write a note on the selection criteria of advanced engineering materials	5
Q2(a)	Define Crack propagation rate. Explain crack initiation and propagation in steel with the help of suitable diagrams.	5
(b)	Explain the construction and working principle of optical microscope	5
Q3	What is the resolution of the SEM at 30, 20, 10, 5, and 1 keV if convergence angle is 0.01 radian? Why is it difficult to examine biological materials in the SEM?	10
Q4	Explain the factors affecting the resolution of STM. Also compare constant height and current mode.	10
PART B		
Q5(a)	Describe the various nano -materials that may be used in the fabrication of composites. Which materials may be used for the matrix phase in such cases?	5
(b)	What are smart materials? Comment on the scope of these materials in biomedical applications. Give some specific examples	5
Q6	What is a synthetic polymeric material? Explain different synthetic polymeric materials and write their applications.	10
Q7(a)	Explain dual-purpose materials with suitable examples.	5
(b)	Name various types of intelligent materials. Explain	5
Q8(a)	Discuss sol-gel technique for Nano -material production.	5
(b)	Define biocompatibility . Discuss the properties and application of Mg alloys as a Biomaterial .	5

x-x-x