



Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Smart Materials and Systems

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Define the following terms : i) Smart materials ii) Smart structure iii) System intelligence.	6	L1	CO1
	b.	What is the need of smart system? Explain.	6	L2	CO2
	c.	Discuss the application areas of smart systems.	8	L3	CO2
OR					
Q.2	a.	List out the common smart materials and specify their stimulus response.	10	L4	CO2
	b.	List out the different smart structures and briefly explain them.	10	L1	CO1
Module – 2					
Q.3	a.	What is an Electro Active Polymer (EAP)? Discuss the different configurations of EAP's.	6	L2	CO1
	b.	Outline the classification of piezo electric materials.	7	L2	CO2
	c.	List out the suitable applications of piezo electric polymers.	7	L4	CO3
OR					
Q.4	a.	What are the important applications of Carbon Nano Tube (CNT)? Discuss briefly.	10	L3	CO3
	b.	Outline the characteristics of piezo electric ceramics and discuss the applications of piezo electric ceramics.	10	L3	CO3
Module – 3					
Q.5	a.	With a neat sketch explain how the Nitinol is produced in Vacuum Arc Remelting (VAR) process.	7	L1	CO2
	b.	Define Shape Memory Alloy (SMA) and classify the SMA's in detail.	7	L4	CO1
	c.	Outline applications of Nitinol	6	L3	CO3
OR					
Q.6	a.	Discuss the functional properties of SMA's.	10	L1	CO2
	b.	Define the shape memory polymer (SMP) and list out the advantage and limitations the SMP's.	10	L2	CO1
Module – 4					
Q.7	a.	How you will groupify the smart polymers based on stimuli they respond to? Discuss.	6	L1	CO2
	b.	Write on the importance of electro active polymer microgels.	6	L3	CO1
	c.	What is the basis of selecting the thermo responsive polymer for a particular application? Explain.	8	L4	CO2
OR					
Q.8	a.	Compare the ionic EAP with electronic EAP.	8	L4	CO1
	b.	Differentiate between PH – responsive acidic and basic polymer.	8	L4	CO2
	c.	Discuss on the importance of drug delivery using smart polymers.	4	L3	CO3

Module – 5

Q.9	a.	Distinguish between smart corrosion protection and traditional corrosion protection.	4	L4	CO3
	b.	List out the various types of self healing materials and briefly discuss.	10	L2	CO1
	c.	Discuss the important characteristics of optically activated polymers.	6	L2	CO1
OR					
Q.10	a.	List out the smart materials for space applications and explain them briefly.	10	L3	CO2
	b.	Discuss the salient features of smart coatings for corrosion protection.	10	L2	CO3

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