



First Semester B.E./B.Tech. Degree Examination, June/July 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.	Explain the concept of honeycomb structures and discuss their applications in aerospace, automotive and construction industries.	10	L3	CO1
	b.	What are carbon composites and how are they different from traditional materials like metals.	10	L2	CO1
OR					
Q.2	a.	Describe the role of nano materials in improving the performance of construction materials. Give examples.	10	L2	CO1
	b.	Explain what flash GGBS is and its use as a byproduct in construction industry.	10	L3	CO1
Module – 2					
Q.3	a.	Define prefabricated building components. How do these components differ from traditional methods?	10	L1	CO2
	b.	Identify and explain at least three types of prefabricated building components.	10	L4	CO2
OR					
Q.4	a.	What is modular coordination and how does standardization benefit the production and construction of prefabricated components.	10	L4	CO2
	b.	Discuss the challenges and advantages associated with transportation and installation of prefabricated building components.	10	L2	CO2
Module – 3					
Q.5	a.	Define smart materials and explain how they respond to external stimuli such as temperature, pressure or electric fields.	10	L1	CO3
	b.	Explain the principles of piezoelectricity. How do piezoelectric materials generate electrical charge when subjected to mechanical stress?	10	L4	CO3
OR					
Q.6	a.	Describe the function of a piezoelectric sensor, strain gauge and accelerometer. How are these sensors, used in monitoring and measuring physical quantities?	10	L3	CO3
	b.	What are smart composites and how do they integrate smart materials to enhance the performance of traditional composite materials?	10	L3	CO3

Module – 4

Q.7	a.	Define BIM and explain its necessity in modern construction projects.	10	L1	CO4
	b.	Discuss the advantages of using BIM in building design and infrastructure design.	10	L4	CO4
OR					
Q.8	a.	What is an IBMS? Explain its role in managing various building functions.	10	L3	CO4
	b.	Identify and explain at least two types of IBMS. Discuss their advantages.	10	L1	CO4
Module – 5					
Q.9	a.	Explain the importance of 3D printing in modern manufacturing and design. Briefly describe its historic development.	10	L3	CO5
	b.	Discuss the key advantages of 3D printing over traditional manufacturing methods.	10	L4	CO5
OR					
Q.10	a.	Outline the steps involved in the 3D printing chain, from 3D modelling to post-processing.	10	L2	CO5
	b.	Identify and describe at least two applications of 3D printing in different industries.	10	L1	CO5
