O.P.Code:23ME0305	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year I Semester Regular Examinations February-2025

MATERIAL SCIENCE AND METALLURGY

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define the unit cell.	CO1	L1	2M
	b	Differentiate the solvent and solute with example.	CO1	L4	2M
	c	Wha is cast iron and list the various types of castirons.	CO2	L1	2M
	d	List out the properties of tool and die steels.	CO2	L1	2M
	e	Define the term heat treatment and list out the stages of heat treatment.	CO3	L1	2M
	f	Define hardeability.	CO3	L1	2M
	g	Define powder metallurgy.	CO4	L1	2M
	h	List out the methods of producing metal poweders.	CO4	L4	2M
	i	Define the composites with an examples.	CO5	L1	2M
	j	Define smart materials with an examples.	CO5	L1	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2		List out the various types of solid solutions and explain them with examples.	CO1	L1	10M

OR

3	a	Draw a neat sketch of 'BCC' crystal structure and calculate its packing factor, coordinate number.	CO1	L3	5M
	b	Explain the Hume Rothery's rules in detail.	CO1	L2	5M

UNIT-II

4	a	Explain the structure and properties of white cast iron.	CO2	L2	5M
	b	What is steel and describe the classifications of the steels.	CO2	L2	5M

OR

5		Explain the structure and properties of aluminum and its alloys.	CO2	L2	10M

UNIT-III

6		List the various methods of heat treatment of steel and briefly explain any one method.	CO3	L1	10M

OR

7	a	Draw a diagram of critical cooling rate on TTT diagram and briefly explain it.	CO3	L3	5M
	b	Define cryogenic treatment and discuss their applications.	CO3	L1	5M

UNIT-IV

8	a	Describe the process of milling atomization in powder metallurgy.	CO4	L1	5M
	b	Explain the compacting method in powder metallurgy.	CO4	L2	5M

OR

9		Explain the various secondary operations in powder metallurgy in detail.	CO4	L2	10M

UNIT-V

10		List out the various methods of component manufacture of composites and briefly explain any one method with neat sketch.	CO5	L1	10M

OR

11	a	What are the glasses and explain the manufacturing of glasses.	CO5	L1	5M
	b	What is ceramic material and briefly explain crystalline ceramics.	CO5	L1	5M

*** END ***