Code No: P18MET02

R18

HALL TICKET NUMBER

PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)
II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, JAN - 2023
METALLURGY & MATERIAL SCIENCE
(Common to ME, AME Branches)

Time: 3 hours Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer all the questions in Part-A (5X2=10M)

Q.No.		Questions	Marks	CO	KL
1	a)	Write the primary atomic bonds and give one example for each	[2M]	1	
	b)	Define Cementite in Fe-Fe3C alloy system	[2M]	2	
	c)	Discuss a few applications of tool and die steels	[2M]	3	
	d)	Why tempering is required after hardening of steels? explain	[2M]	4	
	e)	Write a few applications of composite materials	[2M]	5	

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.		Questions	Marks	CO	KL
		UNIT-I			
2.	a)	Derive atomic packing factor for FCC crystal structure	[5M]	1	
	b)	Why materials with smaller grains exhibit better mechanical properties? Explain.	[5M]	1	
		OR			
3.	a)	Draw the basic crystal structures and write the unit cell parameters	[5M]	1	
	b)	Discuss Hume-Rothery principles in producing solid solution alloys	[5M]	1	
		UNIT-II			
4.	a)	Discuss the experimental methods to develop phase diagrams	[5M]	2	
	b)	Draw Fe-Fe3C phase diagrams and explain each zone	[5M]	2	
		OR			
5.	a)	Explain i) eutectic and ii) peritectic phase reactions with neat diagrams	[5M]	2	
	b)	Discuss i) Martensite and ii) Bainite in Fe-Fe3C alloy system	[5M]	2	
		UNIT-III			
6.	a)	Discuss the structure and applications of plain carbon steels	[5M]	3	
	b)	Why Gray Cast iron exhibits better damping properties? explain	[5M]	3	
		OR			
7.	a)	Why stainless steel exhibit better corrosion resistance? explain	[5M]	3	
	b)	How cast irons are different compared with steels? explain	[5M]	3	
		UNIT-IV			
8.	a)	What is hardenability? Explain Jominy end quench test	[5M]	4	
	b)	Discuss the hardening heat treatment and the characteristic of Martensite	[5M]	4	
		OR			
9.	a)	How TTT diagrams are developed? Explain with one example	[5M]	4	

	b)	What do you understand by surface hardening of steels? Write short notes on Nitriding	[5M]	4	
UNIT-V					
10.	a)	Discuss i) crystalline ceramics and ii) glasses	[5M]	5	
	b)	Explain the steps involved in powder metallurgy process	[5M]	5	
OR					
11.	a)	Explain the types of composite materials with examples	[5M]	5	
	b)	What are the potential industrial applications of powder metallurgy? discuss	[5M]	5	

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