Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR/ MAY 2025

Common to Mechanical, Manufacturing, Industrial, Mining, Aeronautical, Automobile and Production Engineering & Rubber and Plastics Technology

Second Semester

PH5251 & MATERIALS SCIENCE

(Regulation2019)

Time: 3hrs Max.Marks: 100

CO1	To make the students to understand the basics of crystallography and crystal imperfections.
CO2	To introduce various strengthening methods of materials, and also various mechanical properties and their measurement.
CO3	To impart knowledge on the basics of phase diagrams and their applications.
CO4	To learn about iron-carbon system, and about various ferrous and non-ferrous alloys.
CO5	To introduce the preparation, properties and applications of ceramics, composites and nanomaterials.

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)

(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Draw the plane with the Miller indices (1 1 1).	2	1	L3
2	What is a nucleation?	2	1	L2
3	What is strain hardening?	2	2	L1
4	Write a short note on Brinell's micro hardness test.	2	2	L2
5	State and explain Gibb's phase rule.	2	3	L2
6	Explain Lever rule.	2	3	L1
7	What are alloy steels?	2	4	L1
8	Write the few applications of titanium alloys.	2	4	L3
9	Give an account on fiber reinforced composites.	2	5	L2
10	Describe the procedure for nanoparticles size calculation using powder X-ray diffraction.	2	5	L3

PART- B(5x 13=65Marks)

(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	Calculate the packing factor of simple cubic (SC), Body Centered Cubic (BCC) and Face Centered Cubic (FCC) crystal structures.	13	1	L3
	OR			
11 (b)	Explain in detail about the edge dislocations and screw dislocations with necessary diagrams	13	1	L3
12 (a)	Sketch and explain different stages of creep. Mention the effect of stress and temperature in creep curve.	13	2	L4
	OR			
12 (b)	Explain the Griffith's theory on brittle fracture and deduce an expression for the critical fracture stress based on Griffith's criterion.	13	2	L4

13 (a)	Explain in detail about the isomorphous Cu-Ni phase diagram.	**13**	3	L4
	OR			
13 (b)	What is eutectic phase diagram? Explain with example different phases formed with composition and temperature.	**13**	3	L4
14 (a)	Explain the isothermal transformation diagram for eutectoid iron-carbon alloy system.	**13**	4	L3
	OR			
14 (b)	Describe the pearlitic transformation and its microstructural feature during cooling.	**13**	4	L3
15 (a)	Write a brief note on refractory and abrasives.	**13**	5	L3
	OR			
15 (b)	What are nanomaterials? Describe their physical and chemical properties of the nanomaterials. Discuss the applications of nanomaterials	**13**	5	L3

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	Draw Fe-Fe_3C phase diagram and explain the phase transformation reaction in the diagram.	**15**	4	L5