P P SAVANI UNIVERSITY

Third Semester of Diploma Examination

November 2022

IDME2030 Material Science & Metallurgy

19.11.2022, Saturday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of one section.
2. Make suitable assumptions and draw neat figures wherever required.
3. Use of scientific calculator is allowed.

Q - 1	**MCQ/Short Question/Fill in the Blanks (Any Twelve)**	**[12]**	**CO**	**BTL**
(i)	Explain Creep		5	1
(ii)	Define: Phase equilibrium diagram.		3	1
(iii)	Justify limited use of cast iron in engineering applications		1	2
(iv)	State the purpose of alloying metals.		1	1
(v)	Define: Bravais Lattice		4	1
(vi)	List major Steel plants of India.		1	1
(vii)	Mention any two causes of corrosion.		6	1
(viii)	Define atomic radius.		4	1
(ix)	List the applications of aluminum from engineering point of view.		1	1
(x)	Define: Fatigue		5	1
(xi)	The property of the material due to which it breaks with little permanent distortion, is called a) Brittleness b) Ductility c) Malleability d) Plasticity		5	3
(xii)	Define notch sensitivity.		5	1
(xiii)	Define: Ductility		5	1
(xiv)	Which of the following cannot be obtained using a phase diagram? a) Melting temperature of various phases b) Temperature range for solidification c) Equilibrium solid solubility d) Purity of materials		3	2
Q - 2 (a)	Explain bonding in solids? Name the various types. Explain any one of them.	**[03]**	3	2
Q - 2 (b)	List down the seven basic crystal systems.	**[04]**	4	1
Q - 2 (c)	Aluminum has an atomic radius of 1.431°A and FCC Structure. Its atomic weight is 26.97 gm/mole. Calculate the atomic packing factor and density of aluminum.	**[05]**	4	3
	OR			
Q - 2 (c)	Explain with neat sketches the arrangements of atoms in B.C.C, F.C.C and H.C.P. lattice.	**[05]**	4	3
Q - 3 (a)	Explain eutectic, eutectoid and peritectic reaction.	**[03]**	3	2
Q - 3 (b)	Explain the flow diagram for the production of iron and steel.	**[04]**	4	2
	OR			

Q - 3 (b)	Identify the reason of surface coating and list the surface coating methods.	[04]	6	2
Q - 3 (c)	Draw TTT diagram and explain various steps involved in it.	[05]	4	3
	OR			
Q - 3 (c)	Draw the iron carbon diagram and state its application.	[05]	3	3
Q - 4 (a)	Classify Ferrous and non-ferrous materials.	[03]	1	1
	OR			
Q - 4 (a)	State the composition and application of gunmetal and babit.	[03]	1	1
Q - 4 (b)	Classify cast iron and state it's properties.	[04]	1	2
	OR			
Q - 4 (b)	Differentiate between destructive and non-destructive testing.	[04]	5	2
Q - 4 (c)	Explain HSS in brief.	[05]	1	2
Q - 5 (a)	State the principle of magnetic particle test.	[03]	5	1
	OR			
Q - 5 (a)	State the different types of corrosion.	[03]	6	1
Q - 5 (b)	Explain ultrasonic testing with the neat sketch.	[04]	5	2
	OR			
Q - 5 (b)	Explain liquid penetration test	[04]	5	2
Q - 5 (c)	Varun is a mechanical engineer and works in a tool manufacturing company. He is required to suggest the deposition method from among PVD and CVD for a tool that demands a tough cutting edge. Which one will Varun use. Justify your answer.	[05]	5	2

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BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create