Question Paper Code | 13697

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Second Semester

Mechanical Engineering

(Common to Mechanical and Automation Engineering)

20BSPH202 - PHYSICS OF MATERIALS

Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K–Level	CO
1.	The elements present in the system are called ---- (a) components (b) system (c) variables (d) temperature	1	K1	CO1
2.	In _____ system, the two components are completely soluble in both liquid and solid states (a) eutectic (b) peritectic (c) isomorphous (d) eutectoid	1	K1	CO1
3.	The steels which contain ------ are called eutectoid steels.. (a) 0.8% C (b) less than 0.8% C (c) more than 0.8% C (d) zero	1	K1	CO2
4.	The number of atoms crossing unit area of cross section per second is proportional to the _____ (a) temperature gradient (b) concentration gradient (c) temperature (d) pressure	1	K1	CO2
5.	The purpose of tensile test is to determine (a) strength (b) ductility (c) toughness (d) all of these	1	K1	CO3
6.	A fracture which takes place by the rapid propagation of crack is known as (a) ductile (b) creep (c) brittle (d) fatigue	1	K1	CO3
7.	_____ materials show the spontaneous magnetization. (a) Diamagnetic (b) Ferromagnetic (c) Paramagnetic (d) Superconducting	1	K1	CO4
8.	The value of 1 Bohr magneton is -----. (a) 9.24×10^{-27} Am^2 (b) 9.27×10^{-27} Am^2 (c) 9.27×10^{-24} Am^2 (d) 9.24×10^{-24} Am^2	1	K1	CO4
9.	Superconductors exhibit perfect -------. (a) paramagnetism (b) diamagnetism (c) ferromagnetism (d) ferrimagnetism	1	K1	CO5
10.	_____ is the principle used to prepare metallic glasses. (a) Annealing (b) Quenching (c) Slow cooling (d) Slow heating	1	K1	CO6

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

11.	What is substitutional solid solution?	2	K1	CO1
12.	Define Hume – Rothery's rule.	2	K1	CO1
13.	Summarize the purposes of adding other elements to plain carbon steel.	2	K2	CO2
14.	State Fick's second law of diffusion.	2	K1	CO2
15.	List out the differences between slip and twinning.	2	K2	CO3
16.	Name the four methods of strengthening materials.	2	K1	CO3
17.	Explain why ferrites are used as transformer core.	2	K2	CO4
18.	Discuss retentivity and coercivity in hysteresis curve.	2	K2	CO4
19.	What is meant glass transition temperature?	2	K1	CO5
20.	What are ceramic materials?	2	K1	CO5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13697**

21.	Mention some applications of fibre reinforced plastics.		*2*	*K1*	*CO6*
22.	List out the applications of engineering ceramics.		*2*	*K1*	*CO6*

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	(i)	Discuss briefly about Tie-line and lever rule.	*6*	*K2*	*CO1*
		(ii)	Explain peritectic phase diagram with one example.	*5*	*K2*	*CO1*

OR

	b)	What is eutectic phase diagram? Explain with example different phases formed with composition and temperature.	*11*	*K2*	*CO1*

24.	a)	Describe the iron-carbon phase diagram and explain different phases formed with respect to change in composition and temperature.	*11*	*K2*	*CO2*

OR

	b)	Explain TTT diagram for steel.	*11*	*K2*	*CO2*

25.	a)	What do you mean by creep? Explain different stages of creep using creep curves.	*11*	*K2*	*CO3*

OR

	b)	Describe how hardness of a material is determined using Brinell hardness test. Give its advantages and limitations.	*11*	*K2*	*CO3*

26.	a)	Explain how magnetic materials classified are based on their magnetic moments. And also compare their properties.	*11*	*K2*	*CO4*

OR

	b)	Explain the structure and properties of ferrites.	*11*	*K2*	*CO4*

27.	a)	Describe the preparation and properties of metallic glasses.	*11*	*K2*	*CO5*

OR

	b)	Discuss in detail the various types of dielectric breakdown.	*11*	*K2*	*CO5*

28.	a)	Describe any two characteristics of shape memory alloys and its applications.	*11*	*K2*	*CO6*

OR

	b)	Elaborate any one of the preparation method of nanomaterials and list out of its applications.	*11*	*K2*	*CO6*