

	St. Philomena's College (Autonomous), Mysore	
	Question Bank	
	Programme: M.Sc. Physics	
	II Semester	
	Course Title: Materials Science (Interdisciplinary Paper) ; QP Code: 96502	
	Course Type: Soft Core	Marks
1	Write a note on high temperature superconductor.	5
2	What are composite material, and explain its different classification in detail.	5
3	Write a note on a) Agglomerated material b) Reinforcement material.	5
4	Explain the difference between laminate and surface coated material.	5
5	Describe the process of surface coatings in material.	5
6	What are semiconductor and hence explain electrical conductivity in intrinsic semiconductors.	5
7	Explain the extrinsic semiconductor with its conductivity properties	5
8	Explain the mechanism of polymerization	5
9	Describe the properties and application of solar energy material.	5
10	Write a note on optoelectronics.	5
11	Write a note on luminescence, fluorescence and phosphorescence.	5
12	Explain single and multi-phase solids with examples.	6
13	Differentiate between interstitial and substitutional solid solutions.	6
14	What are interstitial and intermetallic compounds? Explain	6
15	Define phase. How can the formation of different phases be ascertained by Gibb's Phase rule?	6
16	What is a lever rule? Discuss its significance.	6
17	What is a peritectic system? Describe with a suitable phase diagram.	6
18	Differentiate between white cast iron and grey iron.	6
19	Describe the first, second and third order phase transitions.	6
20	Write a note on i) long range order and ii) short range order.	6
21	Discuss the order and disorder phenomenon in alloy formation.	6
22	Write a note on nucleation and growth process.	6
23	Compare homogeneous and heterogeneous nucleation process.	6
24	Explain the variation of process of nucleation and growth as a function of temperature.	6
25	Describe the overall transformation kinetics as a function of nucleation and growth rates.	6
26	Describe the following tempering processes: i) Martempering ii) Austempering iii) Ausforming	6
27	Explain the process of glass transition.	6
28	Discuss in detail what is overaging.	6
29	Discuss the importance of time scale for phase changes.	8
30	Arrive at the relation for rate of nucleation in a homogeneous nucleation process.	8
31	Discuss the heterogeneous nucleation process for various contact angle θ .	8
32	Discuss the process of solidification of a liquid material.	8
33	Explain the classification of materials with examples	9
34	Describe the level of structure in material Science	9
35	Write a note on relative size within the universe	9
36	Explain the classification of materials depending on the level of structure of material	9
37	Write a note on a) Macro structure b) Micro structure c) Sub structure	9
38	Describe the structural properties of following material i) Crystal structure ii) Electronic structure iii) Nuclear structure ii	9
39	Write a note on structure property relationship of materials	9
40	Explain the difference between crystal structure and sub structure of material	9
41	Explain the crystal structure and its 7 system.	9
42	Describe seven crystal systems with their axis and angles.	9
43	Explain the difference between amorphous and crystalline solids.	9
44	Write the characteristics of amorphous solid and hence mention their uses.	9

45	Write the characteristics of crystalline solid and also write their uses.	9
46	Describe the characteristics of amorphous and crystalline solid, and hence point out the difference.	9
47	Differentiate between amorphous and crystalline solid by explaining their different properties	9
48	Write a note on solid classification based on their arrangement of constituent particle.	9
49	Write a note on non ferrous metal and alloys.	9
50	Explain the aluminium and copper alloys and their uses.	9
51	Explain the metal and alloy used in producing nuclear energy.	9
52	Write a short note on Nickel alloys and hence it's significance.	9
53	Explain composition, properties and application silicate material.	9
54	Explain the classification of silicate with the general formula	9
55	Describe crystalline and non-crystalline state of solid	9
56	Write a note on covalent solid and ionic solid	9
57	Point out any five difference between ionic solid and covalent solid	9
58	Explain the properties and application of covalent solid and ionic solid with their example.	9
59	Write a note on ceramic material.	9
60	Explain thermal and mechanical properties of ceramic material.	9
61	Describe the electrical properties of ceramic material.	9
62	What are ceramics? Explain it's characteristics and properties in dental.	9
63	Explain the difference between liquid crystal and Quartz crystal.	9
64	Explain properties, classification and uses of liquid crystal and hence define Crystal.	9
65	Explain the top down and bottom up approach of synthesis of nano structured material	9
66	Describe the synthesis of nano material using Sol-gel Method	9
67	Write a note on synthesis of nano material using hydrothermal method	9
68	Explain laser ablation method used to synthesis of nano material	9
69	Write a short note solution combustion method. Mention its significance	9
70	Write a note on a) Sol-Gel Method b) Laser ablation method	9
71	Explain the concepts and uses of nano rods	9
72	Describe the use of single wall and multiwall nanotubes.	9
73	Write a note on Fullerenes and tubes	9
74	Describe the application of the following a) Nano wires b) Nano rods c) Quantum dots	9
75	Explain the concepts and uses of nano rods	9
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78	Describe the application of the following a) Nano wires b) Nano rods c) Quantum dots	9
79	What is a solid solution? State and explain the factors worked out by Hume-Rothery which governs the formation of a solid solution.	9
80	State the common physical, chemical and mechanical properties of an alloy and two component alloy system.	9
81	What is a eutectic system? Describe with a suitable phase diagram.	9
82	Explain the following reactions: i) Eutectic ii) Eutectoid iii) Peritectic iv) Peritectoid	9
83	Sketch the Fe-Fe ₃ C phase diagram and elucidate the peritectic, eutectic and eutectoid reactions.	9
84	Discuss in detail the process of recrystallization associated with annealing of a plastically deformed crystalline material.	9
85	Consider the binary phase diagram of Al-Cu and discuss the process of precipitation in metallic systems.	9
86	Discuss the variation of free energy change, Δf as a function of temperature and critical radii size in a homogeneous nucleation process.	10
87	Sketch the T-T-T diagram for a eutectoid steel of 0.8% carbon and discuss the transformation of austenite into different microstructures.	10