SRM VALLIAMMAI ENGINEERING COLLEGE
(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF PHYSICS

QUESTION BANK

II SEMESTER

1920204 – PHYSICS FOR MECHANICAL ENGINEERING

Regulation – 2019

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Prepared by

Dr. M. ANBUCHEZHIYAN Dr. K. THIRUPPATHI, Dr. S. GANDHIMATHI,
Dr. R. NITHYA BALAJI, Dr. S. PADMAJA, Mrs. D. PRAVEENA
and Ms. S. SOWMIYA

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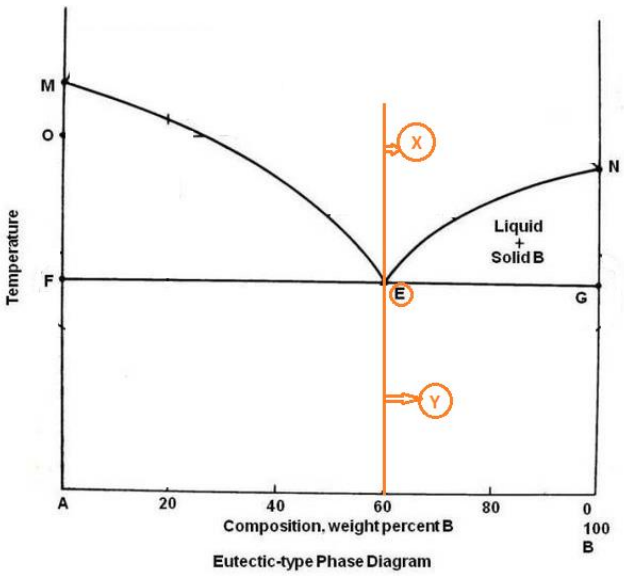
SUBJECT : 1920204 – Physics for Mechanical Engineering
SEM / YEAR: II SEM / 2021-2022

UNIT I - PHASE DIAGRAMS			
Solid solutions - Hume Rothery's rules – The phase rule - Single component system - One-component system of iron - Binary phase diagrams - Isomorphous systems - The tie-line rule - The lever rule - Application to isomorphous system - Eutectic phase diagram - Peritectic phase diagram - Other invariant reactions – Free energycomposition curves for binary systems - Microstructural change during cooling.			
PART – A			
Q.No	**Questions**	**BT**	**Competence**
1.	What are homogenous and heterogeneous systems?	BTL1	Remembering
2.	Differentiate substitutional and interstitial solid solutions with an example.	BTL3	Applying
3.	Write the difference between a solid solution and a compound.	BTL2	Understanding
4.	Give the Hume Rothery's rules for formation of solid solution.	BTL1	Remembering
5.	What is the effect of crystal structure and atomic radii on formation of solid solution between two metallic elements?	BTL3	Applying
6.	What is formed when the electronegativities of atoms differ?	BTL3	Applying
7.	Define degrees of freedom.	BTL1	Remembering
8.	Distinguish a phase and component	BTL1	Remembering
9.	Write a note on phase diagram.	BTL1	Remembering
10.	Mention the significance of phase diagram.	BTL3	Applying
11.	Define Gibb's Phase rule.	BTL1	Remembering
12.	What is a single component or unary system?	BTL1	Remembering
13.	In a binary phase diagram (pressure omitted) what is the maximum number of phases that can coexist for at least one degree of freedom.	BTL2	Understanding
14.	What is meant by tie-line rule?	BTL1	Remembering
15.	State lever rule.	BTL1	Remembering
16.	Mention the use of tie-line rule and lever rule in the binary phasediagram.	BTL3	Applying
17.	Define isomorphous system. Give two examples	BTL1	Remembering
18.	What are liquidus, solidus and solvus line in a phase diagram?	BTL2	Understanding
19.	Write a note on invariant reactions.	BTL1	Remembering
20.	What is meant by peritectoid reaction?	BTL2	Understanding

21.	Differentiate between eutectic and eutectoid phase reactions.	BTL3	Applying
22.	What is meant by syntectic reaction?	BTL1	Remembering
23.	State the monotectoid reaction.	BTL1	Remembering
24.	Give the difference between hypoeutectic alloy and hypereutectic alloy.	BTL1	Remembering
PART-B			
1.	(i) What is a solid solution? Discuss the Hume Rothery's rule for forming a solid solution. (6) (ii) Write short notes on substitutional and interstitial solid solution. (7)	BTL1	Remembering
2.	(i) How are solid solutions classified? Give example for each. (3) (ii) Explain single component system. Discuss in detail about one component of iron with neat diagram. (10)	BTL2	nderstanding
3.	What do you mean by Unary system? Draw and explain the Unary phase diagram of pure iron. (13)	BTL3	Applying
4.	Explain the phase diagram of a one component system with neat sketch. (13)	BTL3	Applying
5.	Explain in detail about binary Isomorphous system and the region present in it. (13)	BTL2	Understanding
6.	Explain tie line rule and lever rule. Also apply the same for an isomorphous system. (13)	BTL3	Applying
7.	Draw a typical equilibrium diagram for a eutectic type of system with limited solid solubility and explain its important features. (13)	BTL2	Understanding
8.	Explain the phase diagram of a system whose solubility is limited and the melting points of the components are comparable. (13)	BTL2	Understanding
9.	Cu and Ag have limited solid solubility. The melting point of Cu is 1085°C and Ag is 779°Cand both the elements have FCC structure. Identify and explain the phase diagram in detail. (13)	BTL3	Applying
10.	Draw a typical equilibrium diagram for a peritectic type of system with limited solid solubility and explain its important features. (13)	BTL2	Understanding
11.	Explain the phase diagram of a system whose solubility is limited and themelting points of the components are vastly different. (13)	BTL3	Applying
12.	Discuss about the invariant reaction in which a solid phase and liquid phase will together form a second solid phase at a particular temperature and composition upon cooling. (13)	BTL2	Understanding
13.	What do you mean by free energy curves? Explain the construction ofphase diagram of completely soluble components from Gibb's energy curves with suitable sketch. (13)	BTL3	Applying
14.	What are the microstructural changes that occur in a binary system?(13)	BTL2	Understanding
15.	Discuss in detail the microstructural changes that takes place in a eutectic system. (13)	BTL2	Understanding
16.	Explain in detail about the changes in microstructure due to equilibrium and non - equilibrium cooling with a neat diagram. (13)	BTL2	Understanding
17.	Explain about Eutectoid, peritectoid, monotectoid and syntectic invariant reactions with an example. (13)	BTL2	Understanding
PART-C			

1.	(i) Draw the phase diagram and explain the system whose components are completely soluble in both liquid and solid state. (8) (ii) Apply the tie line rule and lever rule for the isomorphous system and explain the phase diagram. (7)	BTL3	Applying
2.	Construct a eutectic phase diagram for an alloy whose temperature difference is less and partially soluble at solid phase. Also summarize the microstructural variation occurs for the same. (15)	BTL3	Applying
3.	The melting temperature of the compound A and B are 961°C and 1769°C. Construct a peritectic phase diagram and explain the following reaction $L + \beta \underset{heating}{\overset{cooling}{\longleftrightarrow}} \alpha$ (15)	BTL2	Understanding
4.	Is there possibility of microstructural changes in binary isomorphous system? If so, construct a phase diagram and explain the microstructural changes of thecomposition at particular temperatures. (15)	BTL3	Applying
5.	In the given diagram describe the microstructural changes that takes places in the point X, E & Y in a eutectic system.  Eutectic-type Phase Diagram	BTL3	Applying

UNIT II - FERROUS ALLOYS

The iron-carbon equilibrium diagram - Phases, Invariant reactions - Microstructure of slowly cooled steels - Eutectoid steel, Hypo and Hypereutectoid steels - Effect of alloying elements on the Fe-C system - Diffusion in solids - Fick's laws - Phase transformations - T-T-T-diagram for Eutectoid steel – Pearlitic, Baintic and Martensitic transformations - Tempering of martensite – Steels – Stainless steels – Cast irons.

PART – A

Q.No	Questions	BT	Competence
1.	What is meant by ferrous alloy?	BTL2	Understanding
2.	State three reasons why ferrous alloys are used extensively.	BTL2	Understanding
3.	Name the micro-constituents of iron-carbon alloys.	BTL1	Remembering
4.	Why carbon solubility is more in an austenite?	BTL1	Remembering
5.	Calculate the amount of ferrite and cementite present in pearlite.	BTL3	Applying

6.	What feature in the iron-carbide diagram is used to distinguish between steels and cast irons?	BTL1	Remembering
7.	Distinguish hypo eutectoid steel and hypereutectoid steels.	BTL3	Applying
8.	Differentiate between Martensite and Bainite.	BTL3	Applying
9.	Write a note on pearlite.	BTL1	Remembering
10.	Write the microstructure of Eutectoid steel.	BTL1	Remembering
11.	Differentiate low, medium and high carbon steels.	BTL3	Applying
12.	What are the effects of alloying elements in steel?	BTL1	Remembering
13.	Explain the effect of chromium and molybdenum in low alloy steels.	BTL2	Understanding
14.	Define the term diffusion.	BTL2	Understanding
15.	State Fick's first law of diffusion.	BTL1	Remembering
16.	What is phase transformation? Give examples.	BTL1	Remembering
17.	Why tempered bainite is inferior to tempered martensite with respect to mechanical properties?	BTL3	Applying
18.	What is low Carbon steel?	BTL2	Understanding
19.	Why are steels stainless?	BTL3	Understanding
20.	List the possible classifications of stainless steel based on their microstructure.	BTL3	Applying
21.	How do cast irons differ from steels in terms of carbon content?	BTL2	Understanding
22.	Mention the types of cast irons.	BTL1	Remembering
23.	Write about grey cast iron.	BTL2	Understanding
24.	List out the various morphologies of graphite in cast iron.	BTL3	Applying
PART – B			
1.	Draw the iron- carbon equilibrium diagram and list the invariant reactions in it. (13)	BTL1	Remembering
2.	With a neat sketch of Iron-iron carbide equilibrium diagram, mark on it all salient temperatures and composition fields. (13)	BTL2	Understanding
3.	Explain the various invariant reactions involved in the system with the help of the Fe-C equilibrium diagram. (13)	BTL1	Remembering
4.	Explain the microstructural development for slowly cooled steels. (13)	BTL2	Understanding
5.	Describe the structural changes that take place in hypo and hyper Eutectoid with neat diagrams. (13)	BTL1	Remembering
6.	Explain in detail the microstructural changes that occur in steel with composition less than 0.76 wt% C and greater than 0.76 wt% C. (13)	BTL2	Understanding
7.	Discuss the effects and characteristics of alloying in steel. (13)	BTL3	Analyzing

8.	Alloying additions may be made to cast irons to produce corrosion resistant irons, heat-resistant irons, and high- strength irons. What are the principal additions made for these properties and in what ways are the properties affected? (13)	BTL4	Analyzing
9.	What is diffusion? Derive Fick's first and second law of diffusion equation with necessary diagrams. (13)	BTL3	Applying
10.	Briefly explain the concepts of steady state diffusion and non-steady state diffusion on the basis of Fick's law. (13)	BTL1	Remembering
11.	With the help of temperature- time- transformation (TTT) diagram of eutectoid steel, brief on the microstructure and properties of the following heat treatment process: annealing, normalizing, quench hardening and tempering. (13)	BTL2	Understanding
12.	Describe the various transformations involving the decomposition of austenite with the help of a TTT diagram of eutectoid Steel (13)	BTL2	Understanding
13.	With the help of Isothermal Transformation Diagram explain the transformation of austenite to pearlite, bainite and martensitic. (13)	BTL2	Understanding
14.	What are the main characteristics of stainless steels? Name different types of stainless steels and their main applications. (13)	BTL2	Understanding
15.	Write short notes about the following materials in terms of composition, properties and applications. Austenite stainless steel Ferrite Stainless steel and Martensite stainless steel (13)	BTL2	Understanding
16.	What are the properties and applications of different types of cast iron? Explain in brief. (13)	BTL2	Understanding
17.	What are the different types of cast iron? Draw the microstructure of any four types of cast irons. Give one application for each. (13)	BTL2	Understanding
	PART - C		
1.	With suitable diagrammatic representation, explain the different phases present in the iron-carbon alloy. Also brief the invariant reactions relatedto the phase diagram. (15)	BTL3	Applying
2.	Consider the steels having 0.8% Carbon, > 0.8% Carbon and < 0.8 % carbon. For the above percentage of Carbon, sketch the phase diagrams and explicate the microstructure of steels. (15)	BTL3	Applying
3.	(i) Draw and explain the construction of T-T-T diagram for eutectoid steel. (8) (ii) Brief about pearlitic, baintic and martensitic transformation based on T-T-T diagram. (7)	BTL4	Analyzing
4.	Two metals are coupled together and diffused. Derive the suitable laws toexplain the concept of diffusion. (15)	BTL4	Analyzing
5.	Name the phase reactions occurring in Fe-Fe_3C system. What are the temperatures and compositions at which they occur? (15)	BTL4	Analyzing

UNIT –III MECHANICAL PROPERTIES

Tensile test - Plastic deformation mechanisms - Slip and Twinning - Role of dislocations in slip - Strengthening methods - Strain hardening - Refinement of the grain size - Solid solution strengthening - Precipitation hardening - Creep resistance - Creep curves - Mechanisms of creep - Fracture - The Griffith criterion - Critical stress intensity factor and its determination - Fatigue failure - Fatigue tests - Methods of increasing fatigue life - Hardness - Rockwell and Brinell hardness - Knoop and Vickers microhardness.

PART – A

Q. No	Questions	BT	Competence
1.	Give the principle behind tensile test.	BTL1	Remembering
2.	Define yield stress and ultimate tensile strength.	BTL2	Understanding
3.	What important information is obtained from the percent elongation?	BTL2	Understanding
4.	A steel specimen has a yield stress of 325.95 MPa and modulus of elasticity 2.1×10^{11} N/m^2. Calculate the modulus of resilience.	BTL3	Applying
5.	An Aluminium rod of 12.5 mm diameter is subjected to fracture with a load of 50.5 kN. Calculate the fracture stress for the applied load.	BTL3	Applying
6.	Name the plastic deformation mechanism in metals.	BTL1	Remembering
7.	Define twinning.	BTL2	Understanding
8.	Name the four strengthening methods.	BTL3	Applying
9.	Give the Hall-Petch equation and explain the terms involved in it.	BTL2	Understanding
10.	What is meant by strain hardening?	BTL2	Understanding
11.	Define creep and creep resistance.	BTL1	Remembering
12.	Generally, creep rate in the secondary creep region is a constant with time. Why?	BTL3	Applying
13.	Suggest few methods to improve the creep resistance in alloys.	BTL3	Applying
14.	Define fracture. What is meant by CRSS?	BTL1	Remembering
15.	Why ductile fracture is more preferred than brittle fracture?	BTL4	Analysing
16.	The crack length of a sample of certain material is 4.4μm, and the young's modulus of the material is 60 GPa. The surface energy is 1.32 J/m^2. Calculatethe fracture strength.	BTL3	Applying
17.	What is fatigue?	BTL1	Remembering
18.	List out the factors that lead to fatigue failure.	BTL3	Applying
19.	List the steps of fatigue failure in metals.	BTL3	Applying
20.	Define the term endurance limit in fatigue test.	BTL1	Remembering
21.	Define hardness.	BTL1	Remembering
22.	What type of an indenter and range of load is used in Vickers and Knoop microhardness test?	BTL2	Understanding
23.	Write the expression for Brinell hardness number.	BTL1	Remembering
24.	What is the difference between HRB and HRC?	BTL1	Remembering

PART-B			
1.	Discuss the tensile testing of materials. What are the important qualities that can be obtained from the stress-strain curve? (13)	BTL2	Understanding
2.	With a neat diagram explain the construction and working of tensile machine. Explain the various properties obtained from the tensile test. (13)	BTL2	Understanding
3.	Draw the engineering stress – strain curve for mild steel. Discuss the tensile test and different mechanical properties obtained in tensile testing. (13)	BTL4	Analyzing
4.	**(i)** Explain the mechanism of plastic deformation of metals by slip and twinning. (10) **(ii)** Distinguish slip and twinning. (3)	BTL4	Analyzing
5.	Discuss in detail about the two significant mechanisms of plastic deformation in metals. (13)	BTL2	Understanding
6.	Elaborate the four main strengthening methods against plastic yield. (13)	BTL3	Applying
7.	Express the strengthening methods which are used to restrict the dislocation motion. (13)	BTL2	Understanding
8.	(i) Write short note on the different stages in a creep curve. (7) (ii) Explain creep resistance materials with their properties. (6)	BTL1	Remembering
9.	Draw a typical creep curve and brief on the various creep mechanism. (13)	BTL3	Applying
10.	What is fracture? Explain the different types of fracture. (13)	BTL2	Understanding
11.	Explain Griffith's theory of fracture. (13)	BTL1	Understanding
12.	Experiment with fatigue test and the methods of increasing fatigue life. (13)	BTL3	Applying
13.	Draw S-N curve for ferrous and non-ferrous metals and explain the procedure used to obtain S-N diagram. (13)	BTL1	Remembering
14.	(i) Explain Brinell hardness test with its advantages and limitations. (7) (ii) Write a short note on Rockwell hardness test. (6)	BTL1	Remembering
15.	Write in detail about the Vickers micro hardness test with its advantages and disadvantages. (13)	BTL2	Understanding
16.	Discuss the Knoop micro hardness test with its advantages and disadvantages. (13)	BTL2	Understanding
17.	(i) Compare and contrast Vickers micro hardness and Knoop micro hardness. (10) (ii) Distinguish between Brinell and Rockwell hardness test. (3)	BTL4	Analyzing
PART - C			
1.	Explain tensile test. With neat sketch, brief the factors measured from this test. (15)	BTL1	Understanding
2.	A material is tested using creep testing machine. Discuss the mechanism of creep and different stages, the material underwent during the creep testing. (15)	BTL2	Understanding
3.	Write briefly about 1. Brittle fracture 2. Ductile fracture (15)	BTL2	Understanding
4.	Describe fatigue testing and methods for improving fatigue strength of the components. Draw the S-N curve for Aluminium and tool steel.	BTL4	Analyzing
5.	How will you check the macro and micro indentation hardness of the materials? Explain any one micro and macro hardness test methods. (15)	BTL4	Analyzing

UNIT IV - MAGNETIC AND DIELECTRIC MATERIALS			
Introduction - Classification of magnetic materials - Ferromagnetism – Domain theory – Types of energy – Hysteresis – Hard and Soft magnetic materials – Ferrites - Dielectric materials – Types of polarization – Langevin-Debye Equation – Frequency effects on polarization - Dielectric breakdown – Insulating materials – Ferroelectric materials.			
PART – A			
Q.No	**Questions**	**BT**	**Competence**
1.	Classify magnetic materials based on their magnetic moments.	BTL1	Remembering
2.	Elucidate the spin arrangement of Para and Ferro magnetic materials?	BTL2	Understanding
3.	Why diamagnetic materials are called weak magnets?	BTL2	Understanding
4.	A magnetic field strength of 2×10^5 amperes/m is applied to a paramagnetic material with a relative permeability of 1.01. Calculate the magnetic flux density.	BTL3	Applying
5.	What are magnetic domains?	BTL1	Remembering
6.	Mention the type of energy involved in domain theory.	BTL1	Remembering
7.	Recall the terms “Retentivity” and “Coercivity”	BTL2	Understanding
8.	Distinguish hard and soft magnetic materials based on hysteresis loss and susceptibility.	BTL3	Applying
9.	What is antiferromagnetism?	BTL1	Remembering
10.	How is spinel structure formed?	BTL3	Applying
11.	State the applications of ferrites.	BTL1	Remembering
12.	Why ferrites are advantageous for used as transformer cores?	BTL1	Remembering
13.	Define dielectric material.	BTL1	Remembering
14.	What is meant by polarization?	BTL1	Remembering
15.	A crystal is subjected to an electrical field of 1000 V/m and the resultant polarization is 4.3×10^{-8} C/m^2. Calculate the relative permittivity of the crystal.	BTL3	Applying
16.	Compare the active and passive dielectrics.	BTL1	Remembering
17.	Define dielectric breakdown.	BTL1	Remembering
18.	Mention the various breakdown mechanisms.	BTL2	Understanding
19.	What are the ways in which dielectric breakdown can be minimized?	BTL3	Applying
20.	List out the important requirements of insulators.	BTL2	Understanding
21.	Mention the properties of ferroelectric materials.	BTL2	Understanding
22.	Write about piezoelectricity.	BTL1	Remembering
23.	What is Pyroelectricity?	BTL2	Understanding
24.	Write any two applications of ferroelectric materials.	BTL2	Understanding

PART-B			
1.	Explain the classification of magnetic materials based on their spins. (13)	BTL2	Understanding
2.	Compare and contrast the characteristics and properties of diamagnetic, paramagnetic and ferromagnetic material. (13)	BTL2	Understanding
3.	Explain in detail different types of energy involved in domain growth. (13)	BTL2	Understanding
4.	Based on domain theory of ferromagnetism explain a) Domain movement and b) Domain rotation. (13)	BTL2	Understanding
5.	Discuss the domain structure in ferromagnetic materials. Show how the hysteresis curve is explained on the basis of domain theory. (13)	BTL2	Understanding
6.	Draw the B-H curve (Hysteresis) for a ferromagnetic material and explain the Retentivity and Coercivity fields in the B-H curve. (13)	BTL4	Analyzing
7.	What is meant by Hysteresis loss? Describe the formation of Hysteresis loop using domain wall movement. (13)	BTL4	Analyzing
8.	Distinguish between hard and soft magnetic materials. (13)	BTL3	Applying
9.	What are ferrites? Explain the structure of ferrites, properties and its applications. (13)	BTL3	Applying
10.	Discuss about electronic and ionic polarizations with examples in detail. (13)	BTL2	Understanding
11.	State polarization in dielectric materials and explain the ionic, orientational and space charge polarization in dielectric material. (13)	BTL2	Understanding
12.	Explain the different types of polarization mechanism that occur in dielectric materials. (13)	BTL4	Analyzing
13.	Write in detail about the types and various factors contributing to breakdown in dielectrics. (13)	BTL2	Understanding
14.	Discuss in detail about the various dielectric breakdown mechanism. (13)	BTL3	Applying
15.	What is ferroelectricity? Explain the properties of ferro electric materials. (8) Mention any five applications ferro electric materials. (5)	BTL4	Analyzing
16.	Explain the hysteresis curve exhibited by a ferroelectric material with a suitable sketch. Give examples for ferroelectric materials. (13)	BTL4	Analyzing
17.	i) Discuss about the effect of frequency on polarization. (6) ii) Explain about the characteristics and uses of ferroelectric materials. (7)	BTL2	Understanding
PART - C			
1.	Explain the theory of ferromagnetism. Brief the energy involved in the process of domain theory. (15)	BTL2	Understanding
2.	i) Enunciate how ferromagnetic material behaves for a cycle of magnetic field and draw a hysteresis loop for magnetic field vs magnetic induction. (8) ii) Distinguish between hard and soft magnetic materials. (7)	BTL3 BTL2	Creating Remembering
3.	Brief the four types of polarization mechanisms. Derive the appropriate polarizability expressions. (15)	BTL 5	Evaluating

4.	With suitable sketches, explain the different types of breakdown mechanisms in dielectric material. (15)	BTL 1	Understanding
5.	The displacement between positively and negatively charged particles by a small distance on the application of electric field produces electric dipoles. Discuss the polarization phenomenon occurring in various dielectric materials. (15)	BTL 4	Analyzing

UNIT V - NEW MATERIALS

Ceramics – Types and Applications – Composites: Classification, Role of matrix and Reinforcement, Processing of fibre reinforced plastics – metallic glasses: Types, glass forming ability of alloys, melt spinning process, Applications - Shape Memory Alloys: Phases, Shape memory effect, Pseudoelastic effect, NiTi alloy, applications – Nanomaterials:preparation (Bottom up and Top down approaches), Properties and Applications.

PART – A

Q.No	Questions	BT	Competence
1.	What are engineering ceramics?	BTL1	Remembering
2.	Name two crystal structures of ceramic materials.	BTL2	Understanding
3.	Why are ceramics brittle in nature?	BTL3	Applying
4.	What is a cermet?	BTL1	Remembering
5.	Ceramics are stronger in compression than in tension. Reason out.	BTL3	Applying
6.	What is meant by metal matrix composites? Give one example to eachmatrix material and reinforcements used.	BTL2	Understanding
7.	What is meant by fibre reinforced composite?	BTL1	Remembering
8.	Write any two advantages of fibre reinforcedcomposites	BTL1	Remembering
9.	Mention the functions of matrix and fibre in fibre reinforced composites.	BTL3	Understanding
10.	Define metallic glasses.	BTL1	Remembering
11.	What is meant by glass transition temperature?	BTL2	Understanding
12.	List the merits of metallic glasses as transformer core.	BTL1	Remembering
13.	State any four applications of metallic glasses.	BTL2	Understanding
14.	What is meant by shape memory effect?	BTL2	Understanding
15.	Specify two phases of shape memory alloys.	BTL1	Remembering
16.	State pseudo elasticity.	BTL1	Remembering
17.	Mention the advantages and disadvantages of shape memory alloys.	BTL3	Applying
18.	What are nanophase materials? Give examples.	BTL1	Remembering
19.	Write few techniques for synthesis of nano phased materials.	BTL1	Remembering
20.	State top-down method of synthesis of nanomaterial.	BTL1	Remembering
21.	Write your understanding of bottom-up approach in nano materials synthesis.	BTL2	Understanding
22.	Differentiate top down and bottom-up methods.	BTL3	Applying

23.	List any two electrical properties of nanomaterials.	BTL2	Understanding
24.	Mention the applications of nanomaterials in information technology field.	BTL2	Understanding

PART – B

Q.No	Questions	Level	Competency
1.	List out and explain the properties and applications of any four types of ceramics. (13)	BTL1	Remembering
2.	i) Write a short note on glass ceramics. (7) ii) Give the properties and applications of different ceramics. (6)	BTL3	Applying
3.	i) Give the properties and uses of any one fibre reinforced composite and particle reinforced composite. (10) ii) State the law of mixtures in composites. (3)	BTL2	Understanding
4.	How are composites classified based on the matrix phase? Compare them based on their properties and applications. (13)	BTL4	Analysing
5.	What is strengthening mechanism? Explain the strengthening mechanism of fibre reinforced composites. (13)	BTL3	Applying
6.	Write a short note about different types of matrix material and reinforced material used to make polymer matrix composites. (13)	BTL5	Evaluating
7.	What are metallic glasses? Describe the preparation, properties and applications of metallic glasses. (13)	BTL2	Understanding
8.	Describe in detail the development, properties and applications of metallic glasses. (13)	BTL2	Understanding
9.	How are metallic glass produced by melt spinning method? List out the properties and applications of metallic glasses. (13)	BTL2	Understanding
10.	What are shape memory alloys (SMA)? Describe the characteristics of SMA and its applications? (13)	BTL3	Applying
11.	i) Write in detail about Shape Memory Alloys. (7) ii) List out the characteristics and applications of SMA (6)	BTL1	Remembering
12.	Discuss in detail about shape memory effect, pseudo elasticity and hysteresis effect of SMA. (13)	BTL2	Understanding
13.	What are nanomaterials? Explain the properties and applications of nanomaterials. (13)	BTL2	Understanding
14.	Describe the preparation of nano materials by top-down approach. (13)	BTL1	Remembering
15.	Explain in detail the preparation of nano materials by bottom-up processes. (13)	BTL5	Evaluating
16.	Describe the method of producing nano materials using Pulsed Laser Deposition. (PLD) (7) Chemical Vapour Deposition. (CVD) (6)	BTL3	Applying
17.	Discuss in detail about the properties and applications ofnanomaterials. (13)	BTL2	Understanding

PART - C			
1.	State reinforcement. Explain how fibre reinforcement plastic composites can be produced. (15)	BTL 3	Applying
2.	i) Elaborate melt spinning method to produce metallic glasses. (8) ii) Give the properties and applications of metallic glasses. (7)	BTL 2	Understanding
3.	Discuss the one way and two-way shape memory effect. Write down phases of shape memory alloy with respect to temperature, properties and applications. (15)	BTL3	Applying
4.	Elucidate any one bottom-up approach and top-down approach of preparing nanomaterials. (15)	BT L2	Understanding
5.	i)Explain the preparation of metallic glass by rapid quenching technique. (6) ii)Discuss the mechanical, chemical and magnetic properties of nanoparticles. (9)	BTL3	Applying