Reg.	No.						
ode 11739							

**Question Paper C** 

# **B.E./B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022**

Second Semester

#### **Mechanical Engineering**

(Common to Mechanical and Automation Engineering)

### 20BSPH202 - PHYSICS OF MATERIALS

(Regulations 2020)

**Duration: 3 Hours** 

Max. Marks: 100

#### PART - A $(10 \times 2 = 20 \text{ Marks})$

Answer ALL Questions								
	Marks K-Level,CO							
Define Hume Rothery's Emperical formula for the substitutional solid solutions.	2,K2,CO1							
What is Gibb's Phase rule?								
State First and Second Fick's law of diffusion.								
What is meant by slip plane system?								
Define Creep resistance.								
List the four factors that affect hardening process of steel.								
7. A paramagnetic material has a magnetic field intensity of 10 <sup>4</sup> Am <sup>-1</sup> . If the								
. NOTE NOTE NOTE NOTE NOTE NOTE NOTE NOTE								
What are composites? Give example for manmade and natural composites.								
10. What is meant by Quenching?								
PART - B (5 × 13 = 65 Marks) Answer ALL Questions								
isomorphous system and the region present in it.	13,K2,CO1							
b) Discuss the free energy composition curves for binary and eutectic system.	13,K2,CO1							
reaction in it.	13,K2,CO2							
b) Explain the biantic and martenstic transformations with the neat diagram of TTT diagram for eutectoid steel.	13,K2,CO2							
	Define Hume Rothery's Emperical formula for the substitutional solid solutions.  What is Gibb's Phase rule?  State First and Second Fick's law of diffusion.  What is meant by slip plane system?  Define Creep resistance.  List the four factors that affect hardening process of steel.  A paramagnetic material has a magnetic field intensity of 10 <sup>4</sup> Am <sup>-1</sup> . If the susceptibility of the material at room temperature is 3.7 × 10 <sup>-5</sup> . Calculate the magnetization in the material.  Differentiate hard and soft magnetic materials.  What are composites? Give example for manmade and natural composites.  What is meant by Quenching?  PART - B (5 × 13 = 65 Marks)  Answer ALL Questions  a) What is binary phase diagram? Explain in detail about binary isomorphous system and the region present in it.  OR  b) Discuss the free energy composition curves for binary and eutectic system.  a) Draw the iron carbon equilibrium diagram and list the invariant reaction in it.  OR  b) Explain the biantic and martenstic transformations with the neat							

11739

13. a) Explain the various properties obtained from tensile test using stress- 13,K2,C03 strain curve.

OR

- b) What is fracture? Discuss the different types of fracture. 13,K2,CO3
- 14. a) Discuss the domain structure in ferromagnetic materials. Show how the 13,K2,C04 hysteresis curve is explained on the basis of domain theory.
  - b) What is meant by local field in a dielectric? And how it is calculated 13,K2,C04 for a cubic structure? Deduce the Clausius Mosotti relation.
- 15. a) What are metallic glasses? Describe the preparation, properties and 13,K2,C05 applications of metallic glasses.

OR

b) Describe about Nano phase Material Properties and Applications 13,K2,C05

## PART - C $(1 \times 15 = 15 \text{ Marks})$

16. a) (i) List and explain the properties of Superconductors.

(ii) Prove that susceptibility of superconductor is -1 and relative 5,K2,C06

OR

permeability is zero.

b) What are shape memory alloys (SMA)? Describe the characteristics of 15,K2,C06 SMA and its applications.