Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023

Semester : Semester II - 2022
Course Code : PHY1001
Course Name : Sem II - PHY1001 - Material Physics
Program : CIV&PET

Date : 12-JUN-2023
Time : 1.00PM - 4.00PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS **(15 X 2 = 30M)**

1. Write the stacking sequence of the atomic arrangement for FCC and HCP structures.
(CO1) [Knowledge]
2. Define coordination number and packing factor?
(CO1) [Knowledge]
3. How surface area plays an important role in nanomaterials?
(CO4) [Knowledge]
4. What are the Factors that affects the Corrosion rate?
(CO3) [Knowledge]
5. Calculate the wavelength of emitted radiation from nano material which has a band gap of 1.44 eV.
(CO4) [Knowledge]
6. Write few properties of ceramic materials?
(CO2) [Knowledge]
7. What type of indenter is used in the Vickers hardness test method also write the relation between yield stress and Vickers hardness test.
(CO2) [Knowledge]
8. Convert 30°C scale to Fahrenheit and Kelvin scale?
(CO3) [Knowledge]
9. When quantum confinement effect is observed in nanomaterials.
(CO4) [Knowledge]

10. Calculate the energy band-gap of nanoparticles which emits output wavelength 671 nm.

(CO4) [Knowledge]

11. Define Hardness, name any two techniques to measure the hardness.

(CO2) [Knowledge]

12. Define Heat capacity and specific heat capacity.

(CO3) [Knowledge]

13. Calculate the interplanar spacing of (100), (110) and (111) planes for a simple cubic structure?

(CO1) [Knowledge]

14. What is the principle of thermopile?

(CO3) [Knowledge]

15. Explain difference between toughness and resilience.

(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS **(4 X 10 = 40M)**

16. a) What are the primary differences between elastic, anelastic, viscoelastic and plastic deformation Behaviours? explain neatly with a graph.
b) What is meant by ductility of material? how do you measure the ductility of the material, name two ductile matals.

(CO2) [Comprehension]

17. Explain the classification of nanomaterials based on the dimension with examples and neat diagrams.

(CO4) [Comprehension]

18. a) Obtain a relation between the coefficient of Area expansion (β-beta) and the coefficient of linear expansion (α-Alpha). (5 Marks)
b) A metal bar measures 60 cm at 10 ^oC. What would be its length at 110 ^oC, α = 1.5 x 10^{-5} /^oC. (5 Marks)

(CO3) [Comprehension]

19. What are Bravais lattices systems in three dimensions? Explain Bravais lattice using lattice parameters (a, b, c) and angles (α , β ,γ).

(CO1) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS **(2 X 15 = 30M)**

20. (a) How to distinguish single-walled carbon nanotubes, multi-walled nanotubes, and graphene. (7 marks)
(b) what are the different types of corrosion types, explain any four corrosion types and also explain any three ways to protect the materials from corrosion (8 Marks)

(CO3,CO4) [Application]

21. a) Draw the (121) (122) and (120) planes and the [112] and [120] directions of a simple cubic crystal.
b) A steel wire of length 4.7 m and a cross-sectional area of **3 x** $10^{-5}\,m^2$ stretches by the same amount as a copper wire of length 3.5 m and a cross-sectional area of 4 **x** $10^{-5}\,m^2$ under a given load. What is the ratio of Young's modulus of steel to that of copper?

(CO1,CO2) [Application]