

19U610

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Name:

Reg.No:

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2022

(CBCSS - UG)

CC19U PHY6 B14 - MATERIALS SCIENCE

(Physics - Elective Course)

(2019 Admission - Regular)

Time : 2.00 Hours

Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

Answer *all* questions. Each question carries 2 marks.

1. With an example explain how covalent bonding is formed?
2. Differentiate between crystalline and non crystalline materials.
3. Define atomic packing fraction
4. What is crystal imperfections? Explain
5. What is screw dislocation?
6. Cite two reasons why interstitial diffusion is normally more rapid than vacancy diffusion?
7. What is meant by abrasives?
8. What are Carbon nanotubes?
9. Differentiate between polymorphism and isomerism.
10. Give the relationship between interplanar spacing and miller indices.
11. Explain microstructure and microscopy.
12. Differentiate between transmission electron microscope and scanning electron microscope.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer *all* questions. Each question carries 5 marks.

13. Explain classification of materials.
14. Determine the linear density of [110] direction of FCC structure in terms of atomic radius.

15. State Fick's first law of diffusion for steady state
16. The activation energy for the diffusion of carbon in chromium is 111,000 J/mol. Calculate the diffusion coefficient at 1100 K (827 °C), given that D at 1400 K (1127C) is $6.25 \times 10^{-11} \text{ m}^2 / \text{s}$.
17. What is meant by stress-strain behaviour of ceramic materials?
18. Explain the physical characteristics of a polymer based on its structure.
19. What is meant by stress relaxation and viscoelastic creep?

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any *one* question. The question carries 10 marks.

20. Explain secondary bonding with suitable examples.
21. Derive Bragg's law for X-ray diffraction in crystals. Describe and explain rotating crystal method of crystal structure analysis.

(1 × 10 = 10 Marks)
