K16U 0225

Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CCSS – Reg./Supple./Improv.)
Examination, May 2016
CORE COURSE IN PHYSICS
6B15 PHY(E) : Material Science (Elective)
(2012 Adm. Onwards)

Time : 3 Hours   Max. Weightage : 30

SECTION – A

Multiple choice questions in bunches of **four**. **Each** bunch carries a weightage of 1 :

1. I) Which of the following imperfections is the two dimensional ?

    a) Point   b) Line   c) Surface   d) Volume

    II) The tilt angle of a tilt boundary in BCC iron (a = 2.87 Å) with edge dislocations 7500 Å apart is

    a) $0.04°$ b) $0.2°$ c) $0.02°$ d) 0.33 rad

    III) The unit of the diffusion coefficient D is

    a) MS^{-2} b) $m^{-2}s^{-1}$ c) $m^2 s^{-1}$ d) $m^2 s$

    IV) Which of the following is the unit of Poisson ratio

    a) N/m^2 b) Pascal   c) N/m^3 d) None of the above

2. I) Name the point which is a suspension of an oil phase in nature

    a) Dispersion   b) Emulsion   c) Latex   d) None of the above

    II) Optical fibres are based on the principle of

    a) Refraction   b) Scattering   c) Diffraction   d) None of the above

    III) The energy gap in diamond is

    a) 5.4eV   b) 2 – 3 ev   c) 1.1ev   d) 0.08 ev

    IV) As compared to S1, the electron mobility in GaAs is

    a) Slower by about five times   b) Same

    c) Faster by about six times   d) Faster by about 200 times   (2×1=2)

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SECTION – B

Answer **any six**, **each** question carries **1 W**.

3. What are materials ?
4. List the different type of imperfections.
5. What is meant by diffusion ?
6. Explain why copper atoms diffuse easily in aluminium than in copper itself.
7. Does the Burgers vector change with the size of the Burgers circuit ?
8. Write short notes on ceramic materials.
9. What do you mean by smart materials ?
10. Name any four semiconductor devices.   (6×1=6)

SECTION – C

Answer **any nine** questions. **Each** question carries a weightage of **2** :

11. Compute the self energy of screen dislocation in FCC crystal (Cu). The Burger's vectors in FCC crystal is $\frac{a}{2}\langle 100\rangle$. $G = 45$ GN/m². a = 3.61 Å.
12. What are the source of dislocation ?
13. List and explain the mechanism of diffusion.
14. State and explain steady-state diffusion.
15. Briefly explain the tensile properties of materials.
16. Distinguish between hardness and toughness.
17. Briefly explain the mechanism of plastic deformation.
18. Give a brief account of various types of glasses.
19. What are the basic steps in the processing of ceramic products ?
20. Explain why the conductivity of a semiconductor change with impurity content.
21. Briefly explain magnetic moments due to electron spin.
22. Discuss the phenomenon of polarization in an insulating materials.   (9×2=18)

SECTION – D

Answer **any one**. **Each** question carries **4 W**:

\. List and explain the different mechanism for self diffusion process.

List and explain the various properties and application of ceramics.   (1×4=4)