



M 8351

Reg. No. :

Name :

VI Semester B.Sc. Degree (CCSS-Reg./Sup./Imp.) Examination, May 2015
(2012 Admn.)

CORE COURSE IN PHYSICS
6B11PHY : Material Science – Elective (E)

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 is the one dimensional imperfections ?
 - a) Point
 - b) Line
 - c) Surface
 - d) Volume
 - ii) A cation vacancy and an anion vacancy in a crystal of the type AB is called
 - a) Schottky defect
 - b) Frenkel defect
 - c) Pair of vacancies
 - d) None of these
 - iii) The unit of flux J is
 - a) atoms $m^{-2}s^{-1}$
 - b) atoms m^2s^{-1}
 - c) moles $m^{-2}s^{-1}$
 - d) moles $m^{-3}s^{-1}$
 - iv) Elastic anisotropy of a crystal is a function of
 - a) Volume
 - b) Temperature
 - c) Direction
 - d) None of the above
2. i) Name the liquid used in Emulsion coating.
 - a) Water
 - b) Kerosine
 - c) Thinners
 - d) None of the above
 - ii) In air-dry enamel, the drying occurs at room temperature by
 - a) oxidation
 - b) polymerisation
 - c) both a) and b)
 - d) none of the above

P.T.O.



- iii) As compared to Si, 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
- iv) With increase in temperature, the orientation polarization in general
- a) Increases b) Decreases
- c) Constant d) None of the above

SECTION – B

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

3. What do you understand by 'material science' ?
4. Discuss the imperfections in crystals.
5. List the factors that affect the diffusivity of a system.
6. Explain non-steady-state diffusion.
7. List the factors affecting the mechanical properties of a metal.
8. Explain the properties of ceramics.
9. Name any one super alloys and give its application.
10. How magnetic materials are classified ?

SECTION – C

Answer **any nine** questions, **each** question carries a weightage of **2**.

11. Distinguish between edge dislocation and screw dislocation.
12. List the different movements of dislocation and explain it.
13. State and explain Fick's first law of diffusion.
14. Briefly explain carburization of steel.
15. Briefly explain the elastic properties of materials.
16. Distinguish between slip and twinning.



17. Briefly explain strengthening mechanism in metals.
18. Explain the effect of tempering glass.
19. What is the sintering process ? What occurs to the ceramic during sintering ?
20. The resistivity of pure silicon at room temperature is 3000 ohm m. Calculate the intrinsic carrier density.
21. Give a short account of ferromagnetism and its applications.
22. Draw the B-H curve for a ferromagnetic material and explain its importance.

SECTION – D

Answer **any one** question, **each** question carries **4 W**.

23. Explain the mechanism of solidification of crystalline materials.
24. Explain the following :
 - i) Smart materials and its applications.
 - ii) Semiconductor devices and its applications.