C 80039 (Pages : 3) Name.....

Reg. No.....51

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, MARCH/APRIL 2015

(U.G.—CCSS)

Physics—Elective Course

PH 6B 20 (E03)—MATERIAL SCIENCE AND THIN FILMS

Time : Three Hours Maximum : 30 Weightage

Section A

Answer **all** *twelve questions.*
Each question carries ¼ weightage.

1. The bond order of N-O bonds in nitrate ion is :
   (a) 1.0. (b) 1.5.
   (c) 1.25. (d) 0.5.
2. The co-ordination number of a metal crystallizing in a hexagonal close packed structure is :
   (a) 4. (b) 6 .
   (c) 8. (d) 12.
3. Both Schottky and Frankel defect occur in :
   (a) AgBr. (b) Vanadium oxide.
   (c) FeO. (d) ZnO.
4. Neoprene is a polymer of :
   (a) Isoprene. (b) Butadiene.
   (c) Styrene. (d) Chloroprene.
5. In a pening gauge the pressure range is ———.
6. Dislocations are important for studying the ——— properties of solids.
   (a) Mechanical. (b) Chemical.
   (c) Electrical. (d) Magnetic.
7. In a typical thin film coating unit the substrate to source distance is between :
   (a) 1 to 10 cm. (b) 10 to 50 cm.
   (c) 50 to 100 cm. (d) None of the above.
8. Sputter deposition method is also called :
   (a) Pure method. (b) Simple method.
   (c) Dirty method. (d) Old method.
9. SEM stand for ———.

Turn over

10. In obtaining X–Ray photograph of our hand, we use the principle of :
    (a) Shadow photography.
    (b) Photoelectric effect.
    (c) Image formation by optical spectrum.
    (d) Ionization produced by X–rays.
11. The detailed X–Ray images of the slices of the body is obtained by means of :
    (a) Computerized axial tomography. (b) Fluoroscop.
    (c) MRI. (d) None of the above.
12. The use of superconducting magnets in MRI is to obtain :
    (a) Signals from surface tissues. (b) High R.F. field.
    (c) High strength gradient fields. (d) High strength magnetic field.

Section B

Answer **all** *nine questions.*
Each question carries 1 *Weightage.*

13. Distinguish between polymorphism and allotropy.
14. With suitable example explain the properties of alloys.
15. Explain kirkendall effect.
16. What is meant by pumping speed of a rotary pump ?
17. Explain the principle of thermal evaporation technique for thin film fabrication.
18. Compare the action of vacuum pump to that of a refrigerator.
19. Cite two reason why interstitial diffusion is normally more rapid than vacancy diffusion.
20. Discuss the principle of four probe method for the measurement of thickness of thin films.
21. Explain the principle of TEM.

(9 × 1 = 9 weightag

Section C

Answer any **five** *questions.*
Each question carries 2 *weightage.*

22. Discuss in detail about the mechanism of polymerization and step polycondensation.
23. What are the most important source of defects in crystals ? Explain.
24. Briefly explain the difference between self diffusion and interdiffusion.
25. Explain the mechanism of Flash Evaporation.
26. Explain the principle of electron scanning for chemical analysis.
27. Discuss any one method of crystal growth.
28. Give a short note on Spray Pyrolsis.

(5 × 2 = 10 weigh

Section D

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Answer any **two** *questions.*
Each question carries 4 weightage.

29. Explain in detail the factors that influence diffusion and derive and expression for diffusion coefficient.

30. What is meant by sputtering ? Describe the different sputtering techniques useful for thin film preparation. Explain one such technique in detail, giving a neat diagram.

31. Explain in detail with a neat sketch the principle and working of Tunneling Electron Microscope.

(2 × 4 = 8 weightage)