Exam.Code:0906
Sub. Code: 6666

1019

B.E. (Mechanical Engineering)
Second Semester
APH-207: Physics of Materials
(Common with ECE, IT and EEE)

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

Q I. Attempt any five of the following (5x 2=10):

(a) Why metals are mostly opaque. Explain in terms of chemical bonding.

(b) Differentiate between primitive and non-primitive lattice.

(c) What is the information derived from x-ray diffraction studies in crystals.

(d) What are the Miller's indices for a crystal plane having intercepts 2a, 5b and 3b on x, y and z axes respectively. The ratio for two sides of this crystal is a:b : : 3:2.

(e) How do you estimate relative amount of each phase in binary phase diagram using lever rule.

(f) What information does SN cycle furnishes.

(g) What do you understand by creep.

SECTION A

Q II.

(a) What are Van der Waals bonds. Discuss the properties of Van der Waals solids in light of their bonding. (5)

(b) Discuss the structure of hexagonal unit cell and deduce its atomic packing fraction. (5)

Q III.

(a) Discuss different kinds of defects in crystals. (7)

(b) Show that the five-fold rotational symmetry is prohibited in the crystal. (3)

Q IV.

(a) What are viscoelastic materials. Discuss their properties in light of spring dashpot model. (5)

(b) Discuss the microscopic theory of elasticity exhibited by materials. How do we understand the extent of elasticity and its variation with temperature in light of the microscopic theory. (5)

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SECTION B

Q V.

(a) Discuss the necessity of strengthening a metal subsequent to its plastic deformatio method. How do you strengthen a metal using impurity hardening and grain size reductio methods. (5)

(b) What do you understand by nucleation. Discuss the processes of homogeneous an heterogeneous nucleation (5)

Q VI.

(a) What is fracture of a crystal. Discuss the principle and mechanism of ductile fracture listin its observable fingerprints. (7)

(b) Write a short note on ductile-brittle transitions. (3)

Q VII.

Draw the phase diagram of Sn-Pb alloy and discuss the development of microstructures i this binary eutectic solution on equilibrium cooling. (10

x-x-x