

B.E. DEGREE EXAMINATIONS: NOVEMBER 2009

Second Semester

U07PH203: PHYSICS II

(Common to Aeronautical Engineering, Mechanical Engineering and Mechatronics Engineering)

Time: Three hours

Maximum Marks: 100

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1. Line defect in a crystal is
(A) Interstitials (B) Screw dislocation (C) Twin boundaries (D) stacking faults
2. The capacity of a material to undergo deformation under tension without rupture is
(A) Malleability (B) Brittleness (C) Fatigue (D) Ductility
3. The mobility of electron is the
(A) The flow of electron per unit field
(B) Average electron drifts velocity per unit field strength.
(C) Reciprocal of conductivity per unit charge.
(D) Reciprocal of resistivity per unit charge.
4. The electrical conductivity of semiconductor is of the order of
(A) 10^{-3} mho cm^{-1} (B) 10^{-6} mho cm^{-1} (C) 10^{-8} mho cm^{-1} (D) 10^3 mho cm^{-1}
5. In which of the following materials, the magnetization is nonlinearly related to the applied field
(A) Ferromagnetic (B) Paramagnetic (C) Diamagnetic (D) Antiferromagnetic
6. The losses in a dielectric materials subjected to alternating electric field are determined by
(A) Real part of the complex dielectric constant
(B) Imaginary part of the complex dielectric constant
(C) Both real and imaginary parts of the complex dielectric constant.
(D) Amount of heat liberated
7. Gas coolant employed in a nuclear reactor
(A) O_2 (B) Ne (C) CO_2 (D) CH_4
8. The linear accelerator accelerates particles in a straight line by means of
(A) Pulsed electric field (B) Oscillating electric field
(C) Constant electric field (D) Magnetic field

9. A superconducting material when placed in a magnetic field will
- (A) Attract the magnetic field towards its centre.
 - (B) Attract the magnetic field but transfer it into a concentrated zone.
 - (C) Repel all the magnetic lines of force passing through it.
 - (D) Not influence the magnetic field
10. The magnetic property of the metallic glasses
- (A) Soft magnetic
 - (B) Hard magnetic
 - (C) Anti ferromagnetic
 - (D) Paramagnetic

PART B (10 x 2 = 20 Marks)

11. How a Frenkel defect happened in an ionic crystal?
12. Define the creep in a metal.
13. Mention two failures of classical free electron theory.
14. What is Fermi level in a semiconductor?
15. State the origin of magnetic moment in magnetic materials.
16. Define dielectric strength.
17. Define mass defect in nuclear fission.
18. What is thermonuclear reaction?
19. Mention tow applications of superconductors.
20. What are nano phase materials?

PART C (5 x 14 = 70 Marks)

- 21 (a) (i) Describe edge dislocation and screw dislocation. (6)
- (ii) Discuss the strengthening mechanisms for the improvement of mechanical properties. (8)
- (OR)**
- (b) (i) Discuss Griffith's theory for mechanism of brittle fracture. (9)
- (ii) Explain different stages of creep curve. (5)
- 22 (a) (i) Derive an expression for density of states and hence obtain Fermi energy in terms of density electrons. (10)
- (ii) Write a note on concept of hole. (4)

(OR)

- (b) (i) Discuss the theory of Hall effect and explain the experimental determination of carrier concentration and mobility of charge carriers. (10)
- (ii) Give the applications of Hall effect. (4)

- 23 (a) (i) Explain the structure of ferrites and discuss the types of interaction present in the ferrites. (8)
- (ii) Mention six applications of ferrites. (6)

(OR)

- (b) (i) What is dielectric breakdown? Summarise the various factors contributing to breakdown in dielectrics. (8)
- (ii) Describe the broad classification of insulating materials. (6)

- 24 (a) (i) What is nuclear chain reaction? Give an account of the conditions under which a nuclear chain reaction becomes self sustained (10)
- (ii) Discuss the source of energy in the sun and stars. (4)

(OR)

- (b) (i) Give an account of the working of a scintillation counter. How can gamma ray energies be determined with its help? (9)
- (ii) Describe the principle and working of a bubble chamber. Discuss its merits and demerits. (5)

- (6) 25 (a) (i) Write a note on high temperature superconductors. (4)
- (8) (ii) Discuss the preparation and characterization of high temperature ceramic superconductors. (10)

(OR)

- (9) (b) (i) How do shape memory alloy work? (6)
- (5) (ii) Discuss the characteristics of shape memory alloys. (8)
