Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : Q 2373

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Second Semester

Mechanical Engineering

PH 1153 — PHYSICS – II

(Common to Aeronautical Engineering/Automobile Engineering/
Mechatronics Engineering and Production Engineering)

(Regulation 2004)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the main two failures of classical free electron theory?

2. Distinguish between brittle and ductile fractures.

3. Write down Fermi Dirac distribution function.

4. What are compound semiconductors? Give two examples.

5. What is one Bohr magnetron?

6. What is dielectric break down?

7. Mention any four properties of nuclear forces.

8. What are fast breeder reactors?

9. Explain the effect of critical magnetic field in superconductors.

10. What are metallic glasses?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss the Griffith's theory of brittle fracture of a material. (8)

    (ii) Explain the different stages in creep mechanism. (8)

    Or

    (b) Discuss the following :

    (i) Point defects and line defects. (8)

    (ii) Edge dislocation and screw dislocation (8)

12. (a) (i) Derive an expression for the density of states (12)

    (ii) Discuss how it is used to calculate the Fermi energy of electrons at 0 K. (4)

    Or

    (b) Explain with necessary theory the Hall effect and the experimental method to determine the electrical conductivity of a semi conductor. (12 + 4)

13. (a) (i) Discuss the domain theory of ferromagnetism. (8)

    (ii) Explain how the domain theory can be used to explain the magnetic behaviour of ferromagnetic materials. (4)

    (iii) What are ferrites? (4)

    Or

    (b) (i) Obtain the expression for Lorentz field in a dielectric material (12)

    (ii) Derive Clausius Mosotti relation. (4)

14. (a) (i) Give the theory of liquid drop model and discuss how nuclear fission is explained based on liquid drop model. (10 + 4)

    (ii) Calculate the energy released in the fusion of two deuterium nuclei mass of $_1H^2 = 2.01478$ amu and mass of $_2He^4 = 4.00388$. (2)

    Or

    (b) (i) Obtain Einstein mass energy relation. (10)

    (ii) Derive 'Four factor formula'. (6)

15. (a) (i) Explain Type 1 and Type 2 superconductors. (8)

(ii) Explain Meissner effect and the effect of isotopes on superconductors. (8)

Or

(b) (i) What are nanophase materials? Explain how the physical properties vary with geometry. (8)

(ii) What are shape memory alloys? Mention four applications of shape memory alloys. (8)

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