

B.E./IB.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Second Semester

Civil Engineering

PH 2161 - ENGINEERING PHYSICS - II

(Common to all branches of B.E./IB.Tech.)

(Regulation 2008)

Time: Three hours

Maximum: 100 marks

Answer ALL questions.

PART A - (10 x 2 = 20 marks)

1. Define the terms
(a) relaxation time and
(b) mobility.
2. What are the main drawbacks of classical free electron theory of metals?
3. What is meant by Fermi energy? What is physical significance?
4. What is meant by Hall effect? Write an expression for the Hall coefficient.
5. Distinguish between intrinsic and extrinsic semiconductors.
6. What do you understand by the terms "critical temperature" and "critical field" of a superconductor?
7. Distinguish between soft and hard magnets.
8. Mention four types of polarization mechanisms that can take place in the presence of an electric field in dielectric materials.
9. What are shape memory alloys? What are their properties?
10. What are the applications of carbon nanotubes?

PART B - (5 x 16 = 80 marks)

11. (a) (i) State the assumption of the classical free electron model. (4)
(ii) Obtain an expression for the electrical conductivity of a metal on the basis of classical free electron theory. (8)
(iii) The mobility of electron in copper is $3 \times 10^{-3} \text{ m}^2/\text{Vs}$. Assuming $e = 1.6 \times 10^{-19} \text{ C}$ and $m_e = 9.1 \times 10^{-31} \text{ kg}$, calculate the mean free time. (4)

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