

Code: R7100203

**R07**

B. Tech I Year (R07) Supplementary Examinations, May 2012

**APPLIED PHYSICS**

(Common to EEE, ECE, CSE, EIE, BME, IT, E.Con.E, ECC &amp; CSS)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) State and explain Bragg's law.  
(b) What are Miller indices? Draw (1 1 1) and (1 1 0) planes in a cubic lattice.  
(c) Calculate the interplanar spacing for (3 2 1) planes in a simple cubic crystal whose lattice constant is 4.2 A.U.
- 2 (a) Explain the de Broglie's hypothesis.  
(b) Derive time independent Schrodinger wave equation for a free particle.
- 3 (a) Explain Fermi-Dirac distribution for electrons in a metal. Discuss its variation with temperature.  
(b) Explain the terms 'Mean Free Path', 'Relaxation Time' and 'Drift Velocity' of an electron in a metal.  
(c) Discuss the origin of electrical resistance in metals.
- 4 (a) Explain the origin of magnetic moment. Find the magnetic dipole moments due to orbital and spin motions of an electron.  
(b) Explain the terms 'Magnetic Induction' and 'Susceptibility'.  
(c) A magnetic material has a magnetization of 3300 A/m and flux density of 0.044 wb/m<sup>2</sup>. Calculate the magnetizing force and relative permeability of the material.
- 5 (a) State and explain hall effect.  
(b) Derive expression for hall coefficient.  
(c) What are applications of hall effect?
- 6 (a) Explain the characteristics of a laser beam.  
(b) Mention any two applications of laser each in the field of scientific research, engineering and medicine.  
(c) Describe the construction and working of a ruby laser.
- 7 (a) Explain the principle of optical fiber.  
(b) Describe different types of fibers by giving the refractive index profiles and propagation details.  
(c) The numerical aperture of an optical fiber is 0.39 if the difference in refractive index of the material of its core and cladding is 0.05; calculate the refractive index of material of the core.
- 8 (a) Write notes on properties and preparation of nano materials.  
(b) What are the applications of nano materials?

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