

Code: 9ABS102

B.Tech I Year (R09) Supplementary Examinations June 2017

ENGINEERING PHYSICS

(Common to all branches)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 (a) With necessary theory, explain the experimental procedure to determine the wavelength of the light using Newton's rings.
(b) Newton's rings are observed in the reflected light of wavelength $5900\text{\AA}$. The diameter of 10^{th} dark ring is 0.5cm . Find the radius of curvature of the lense used.
- 2 (a) What are Miller indices? Draw (111), (120) planes in a cubic lattice.
(b) Explain Bragg's law of X-ray diffraction.
(c) The Bragg's angle for reflection from the (111) plane in a FCC crystal is 19.2° for an X-ray of wavelength $1.54\text{\AA}$. Compute the cube edge of the unit cell.
- 3 (a) Discuss the de Broglie hypothesis of duality of matter.
(b) Show that the wavelength associated with an electron of mass 'm' and kinetic energy E is given by:
$$\lambda = \frac{h}{\sqrt{2mE}}$$

(c) Calculate the de Broglie wavelength of a proton whose kinetic energy is 1MeV .
- 4 (a) Point out the importance of continuity equation. Deduce the continuity equation, the electrons in a p-type material.
(b) Describe the drift and diffusion currents in a semiconductor.
- 5 (a) Explain magnetic moment due to orbital motion of electrons and derive the expression for Bohr magneton.
(b) An electron in an atom of hydrogen circulates in the orbit of radius 0.052nm . Calculate the change in magnetic moment of electron if a magnetic field of induction 2Wbm^{-2} acts at right angles to the plane of orbit.
- 6 (a) Derive the relation between the probabilities of spontaneous and stimulated emissions in terms of Einstein's coefficients.
(b) Explain the importance of Einstein's coefficients.
- 7 (a) Describe graded index optical fiber along with its refractive index profile.
(b) Calculate the fractional refractive index change for given optical fiber if the refractive indices of core and cladding are 1.563 and 1.498 respectively.
- 8 (a) Explain the electrical properties exhibited by carbon nanotubes.
(b) Explain the basic factors of carbon nanotubes on which its electrical properties depend.
