

Code No: 9ABS102

I Year B.Tech(R09) Regular & Supplementary Examinations, May/June 2011.

ENGINEERING PHYSICS

(Common to all branches)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

1. (a) Explain what is meant by diffraction of light. How diffraction is different from interference?
(b) Discuss Fraunhofer single slit diffraction. Draw intensity distribution curves and give conditions for bright and dark fringes in single slit diffraction pattern.
2. (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.
3. (a) Explain the concept of matter waves.
(b) Derive the expression for de Broglie wavelength.
(c) Explain the consequences of uncertainty principle.
4. (a) Derive the diode equation.
(b) Write notes on LED and Photo Diode.
5. (a) What are the properties of paramagnetic materials?
(b) Discuss the temperature variation of susceptibility in paramagnetic Material by deriving the relation between them.
6. (a) What is penetration depth of a magnetic field on a superconductor And discuss its variation with the temperature.
(b) Describe the significance of penetration depth on superconductor.
7. (a) Describe the function of single mode step index optical fiber along With its refractive index profile.
(b) Explain why step index optical fiber is of reflective type.
8. (a) Explain the Vibrational properties exhibited by Carbon Nanotubes.
(b) Explain the basic factors of Carbon Nanotubes on which its Vibrational Properties depend.

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1. (a) What are the types of diffractions and give the differences between them.
(b) Obtain the condition for primary maxima in Fraunhofer diffraction due to single slit and derive an expression for width of the central maxima.
2. (a) What are Miller indices? How are they obtained?
(b) Deduce the expression for the inter planar distance in terms of Miller indices for a cubic system.
(c) Copper has FCC structure and the atomic radius is 0.1278 nm. Calculate the inter planar spacing for (1 1 0) and (2 1 2) planes.
3. (a) Explain the de Broglie hypothesis.
(b) State and explain uncertainty principle.
(c) Using uncertainty principle, explain the absence of electrons in the nucleus.
4. (a) State and explain Hall effect.
(b) Explain the working of LED and Photo Diode.
5. (a) Discuss ferromagnetism in the case of ferromagnetic materials.
(b) Explain the important features of ferromagnetism.
6. How are the superconductors are classified and describe the behavior Of each type in the presence of magnetic field.
7. (a) Explain why graded index optical fiber is of refractive type.
(b) Explain the advantages of graded index optical fiber when Compared to step index optical fiber.
8. (a) How the Physical and chemical properties of Nanomaterials vary With their size.
(b) Write the important applications of Nanomaterials.

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1. (a) Differentiate between interference and diffraction.
(b) Give the theory of Fraunhofer diffraction due to a double slit and compare the results with that due to single slit.
2. (a) State and explain Bragg's law.
(b) Describe with suitable diagram, the powder method of determination of crystal structure.
(c) Monochromatic X-rays of wavelength 1.5 A.U. are incident on a crystal face having an interplanar spacing of 1.6 A.U. find the highest order for which Bragg's reflection maximum can be seen.
3. (a) State and explain uncertainty principle.
(b) Show that the energies of a particle in a potential box are quantized.
4. (a) Derive the continuity equation for electrons.
(b) Write notes on p-n junction.
5. (a) Explain the salient features of antiferromagnetic materials.
(b) Explain the phenomenon of spontaneous magnetization in ferromagnetic Materials.
6. (a) Explain the importance of population inversion in emission of laser beam.
(b) Describe various methods of achieving population inversion.
7. (a) Describe the function of multi mode step index optical fiber along With its refractive index profile.
(b) Distinguish between single mode and multi mode step index Optical fibers.
8. (a) Mention the important applications of Carbon Nanotubes in Computer field.
(b) Explain the usage of Carbon Nanotubes as fuel cells in batteries.

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1. (a) Explain with necessary theory, the Fraunhofer diffraction due to 'n' slits.
(b) Calculate the maximum number of orders possible for a plane diffraction grating.
2. (a) Define Coordination Number, Nearest Neighbor Distance, Atomic Radius and Packing Fraction.
(b) Explain the powder method of crystal structure analysis.
(c) The Bragg's angle for reflection from the (1 1 1) plane in a FCC crystal is 19.2° for an X-ray of wavelength 1.54 A.U. Compute the cube edge of the unit cell.
3. (a) Explain the Fermi-Dirac distribution function of electrons. Explain the effect of temperature on the distribution.
(b) Write notes on source of electrical resistance.
4. (a) State and explain Hall effect.
(b) Explain the experiment to determine the Hall coefficient.
5. (a) Discuss the characteristic features of ferromagnetic materials.
(b) Discuss the spin arrangements in ferromagnetic, ferrimagnetic and Antiferromagnetic materials.
6. (a) Explain the important components of laser device.
(b) What do you understand by population inversion and how it is achieved?
7. (a) Describe the construction of a typical optical fiber along with the Dimensions of the various parts.
(b) What is total internal reflection? Discuss its importance in Optical fiber.
8. (a) Explain the sensor and catalyst applications of Carbon Nanotubes.
(b) Mention the important applications of Carbon Nanotubes in Material technology.
