Code : 9ABS102

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B.TECH. I Year(R09) Regular Examinations, May/June 2010
ENGINEERING PHYSICS
(Common to all branches)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Explain the principle of Superposition of waves.
   (b) Explain Young's experiment on the basis of wave theory.
   (c) Two coherent sources produce interference pattern. Intensity ratio of bright fringe to dark fringe is 9:1. Calculate the intensity ratio of the sources.
2. (a) Define Coordination Number, Nearest Neighbor Distance, Atomic Radius and Packing Fraction.
   (b) Obtain expressions for Atomic Radius and Packing Fraction for SC, BCC and FCC lattices.
3. (a) Derive time independent Schrodinger wave equation for a free particle.
   (b) Explain the physical significance of wave function.
4. (a) Explain the concept of drift and diffusion current. How they are different?
   (b) Write notes on intrinsic semiconductors.
   (c) Explain charge neutrality in an intrinsic semiconductor.
5. (a) What are dielectric materials and describe the dielectric behaviour in The presence of electric field.
   (b) What is dielectric constant and explain the factors on which it depends.
6. (a) Describe the important characteristics of laser beam.
   (b) Explain the process of Stimulated absorption of radiation along with Its importance.
7. (a) Explain the principle of an optical fiber.
   (b) Describe the fiber construction.
8. (a) Explain the sensor and catalyst applications of Carbon Nanotubes.
   (b) Mention the important applications of Carbon Nanotubes in Material technology.

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Code : 9ABS102 **2**

B.TECH. I Year(R09) Regular Examinations, May/June 2010
ENGINEERING PHYSICS
(Common to all branches)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Explain the phenomenon of interference.
   (b) What are the necessary conditions for obtaining interference fringes.
   (c) Give the analytical treatment of interference of light and hence obtain the condition for maximum and minimum intensity.
2. (a) Define Packing Fraction and show that FCC is the most closely packed one when compared to SC and BCC lattices.
   (b) Iron has BCC structure with atomic weight 55.85 and density 7850 Kg/m3. Find the lattice constant.
3. (a) Explain the de Broglie hypothesis.
   (b) Explain the physical significance of wave function.
   (c) Show that the energies of a particle in a potential box are quantized.
4. (a) Distinguish between n- and p-type semiconductors.
   (b) Explain the detailed mechanism of current conduction in n- and p-type semiconductors.
   (c) Explain charge neutrality in an intrinsic semiconductor.
5. (a) Explain the terms polarization, polarisability, Susceptibility and electric Flux density for dielectric.
   (b) Derive the relation between dielectric constant and susceptibility of a Dielectric.
6. (a) Describe the process of Spontaneous emission of radiation.
   (b) Explain the process of Stimulated emission of radiation and mention Its advantages with respect to Spontaneous emission of radiation.
7. (a) What is the acceptance angle of an optical fiber and derive an Expression for it.
   (b) A fiber has a core refractive index of 1.44 and cladding refractive Index of 1.4. Find its acceptance angle.
8. (a) Mention the important applications of Carbon Nanotubes in Information technology.
   (b) Mention the important applications of Carbon Nanotubes in Biomedical fields.

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Code : 9ABS102 **3**

B.TECH. I Year(R09) Regular Examinations, May/June 2010
ENGINEERING PHYSICS
(Common to all branches)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Explain the concept of coherence.
   (b) Discuss why two different sources of light of the same wavelength cannot produce interference fringes.
   (c) Give the theory of interference and obtain the condition for constructive and destructive interference.
2. (a) Explain the terms 'Basis' and 'Space lattice'.
   (b) Obtain the relation between the edge of the unit cell and atomic radius for SC, BCC and FCC lattices.
   (c) Chromium has BCC structure. Its atomic radius is 0.1249 nm. Calculate the free volume per unit cell.
3. (a) State and explain uncertainty principle.
   (b) Show that the energies of a particle in a potential box are quantized.
4. (a) What is doping? Explain how the doping makes a semiconductor more useful.
   (b) Explain the physical mechanism of conduction in semiconductors.
   (c) Distinguish between intrinsic and extrinsic semiconductors with suitable examples.
5. (a) Explain electronic polarization in a dielectric.
   (b) An elemental dielectric has a relative dielectric constant of 12. It also Contains 5x1028 atoms/ m3. Calculate its electronic polarisability Assuming Lorentz field.
6. (a) Derive the relation between the various Einstein's Coefficients of Absorption and emission of radiation.
   (b) Distinguish between Spontaneous and Stimulated emission of radiations.
7. (a) What is the numerical aperture of an optical fiber and derive an Expression for it.
   (b) An optical fiber has a core refractive index of 1.55 and cladding Refractive index of 1.50. Find its numerical aperture.
8. (a) Mention the importance of Carbon Nanotubes in Energy Storage Applications.
   (b) Mention the important applications of Nanomaterials in medicine.

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Code : 9ABS102 4

B.TECH. I Year(R09) Regular Examinations, May/June 2010
ENGINEERING PHYSICS
(Common to all branches)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Define interference of light.
   (b) Derive an expression for fringe width in interference pattern and show that the fringes are uniformly spaced with relevant ray diagram.
   (c) Two slits separated by a distance of 0.2mm are illuminated by a monochromatic light of wavelength 550nm. Calculate the fringe width on a screen at distance of 1m from the slits.
2. (a) What is Primitive cell? How does it different from unit cell?
   (b) Illustrate the SC, BCC and FCC crystal structures.
   (c) Derive the expression for density of the crystal in terms of lattice constant.
3. (a) Explain the de Broglie hypothesis.
   (b) Derive time independent Schrodinger wave equation for a free particle.
4. (a) Describe the intrinsic conductivity in an intrinsic semiconductor.
   (b) Derive an expression for intrinsic carrier concentration in an intrinsic semiconductor.
5. (a) Define the terms ionic polarization and ionic polarisability for an ionic Dielectric.
   (b) Describe ionic polarization in an ionic dielectric.
6. (a) Explain the importance of population inversion in emission of laser beam.
   (b) Describe various methods of achieving population inversion.
7. (a) Describe briefly the different types of optical fibers with neat Diagrams.
   (b) Calculate the refractive indices of core and cladding of an optical Fiber with a numerical aperture of 0.33 and their fractional change Of refractive indices being 0.02.
8. (a) What are Nanomaterials? How they are classified.
   (b) Describe the basic principles of Nanomaterials.

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