

**Code No: 111AD****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech I Year Examinations, November/December - 2015****ENGINEERING PHYSICS****(Common to all Branches)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A****(25 Marks)**

- 1.a) Write the properties of ionic crystals. [2]
- b) Define and derive Bragg's law. [3]
- c) Define phase space and ensemble. [2]
- d) Explain the significance of wave function. [3]
- e) Define electric dipole, dielectric constant and polarizability. [2]
- f) Write short notes on type I and type II superconductors. [3]
- g) Discuss about attenuation in fibers. [2]
- h) Define spontaneous and stimulated emission. [3]
- i) Explain the principle of LED. [2]
- j) Explain the significance of surface to volume ratio in nanotechnology. [3]

**PART-B****(50 Marks)**

- 2.a) Derive an expression for cohesive energy of diatomic molecule.
- b) Define unit cell, lattice parameters, basis and space lattice.
- c) Write short notes on diamond structure. [3+3+4]

**OR**

- 3.a) Discuss about seven crystal systems and their corresponding Bravais lattice.
  - b) Prove that FCC is closely packed when compared to BCC crystals.
  - c) What are point defects? Discuss. [3+3+4]
- 4.a) Explain construction, working and principle of Davison and Germer's experiment with the help of neat diagram.
  - b) Explain the classification of solid materials into three groups. [5+5]

**OR**

- 5.a) Estimate the energy of a particle in infinite square potential well.
- b) Explain the concept of electron gas.
- c) Write short notes on effective mass of an electron. [3+3+4]

- 6.a) Derive an expression for internal fields of a dielectric material.  
b) Write short notes on piezo-electricity and ferro-electricity.  
c) Explain classification of magnetic materials and their properties. [4+3+3]

**OR**

- 7.a) Explain domain theory of ferromagnetism.  
b) Obtain an expression for electronic polarizability.  
c) Write applications of superconductors. [3+4+3]

- 8.a) Explain the procedure to obtain the radius of curvature of given plano-convex lens using Newton's rings experimental setup.  
b) Discuss about various types of pumping mechanism in lasing action.  
c) Explain principle, working and construction of Ruby laser. [3+3+4]

**OR**

- 9.a) Explain Fraunhofer diffraction using single slit and extend it to N slits.  
b) Discuss about the construction of optical fiber.  
c) Compare step index and graded index fibers. [4+3+3]

- 10.a) Obtain the position of Fermi level and estimate concentration of charge carriers in n-type semiconductor.  
b) Discuss about the factors affecting the architectural acoustics and suggest the remedies.  
c) Discuss about the synthesis of nano-materials using sol-gel technique. [3+3+4]

**OR**

- 11.a) Discuss about working of LED and solar cell.  
b) Derive Sabine's formula of reverberation.  
c) What is quantum confinement process? Explain. [3+3+4]

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