

Code No: 131AC

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, December - 2016

ENGINEERING PHYSICS

(Common to CE, ME, MCT, MMT, MIE, CEE, MSNT)

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) Explain the concept of coherence. [2]
- b) Distinguish between Fresnel and Fraunhofer diffraction. [3]
- c) Discuss the concept of double refraction. [2]
- d) Explain in brief about the stimulated emission. [3]
- e) Discuss about the principle of an optical fiber. [2]
- f) Define acceptance angle and numerical aperture. [3]
- g) Write a short note on miller indices. [2]
- h) Define space lattice, lattice parameters and coordination number. [3]
- i) Write a short note on point defects. [2]
- j) State and explain Bragg's law. [3]

**PART-B**

(50 Marks)

- 2.a) Explain the concepts of division of wave front and amplitude with proper examples.
  - b) Discuss about experimental setup of Newton's rings experiment and derive an expression for radius of curvature of plano-convex lens. [4+6]
- OR**
- 3.a) Derive the condition for diffraction due to single slit and extend it to N-slits.
  - b) Explain diffraction grating experiment. [5+5]
- 4.a) Describe the construction, principle and working of Nicol prism.
  - b) Describe the principle of quarter and half wave plates. [5+5]
- OR**
- 5.a) Establish the relation between Einstein's coefficients.
  - b) Describe the principle, construction and working of Ruby laser. [5+5]
- 6.a) What are the reasons for attenuation in optical fibers? Explain.
  - b) Obtain an expression for acceptance angle in an optical fiber. [5+5]
- OR**
- 7.a) Write in detail about step index and graded index fibers.
  - b) Explain the construction of optical fiber. Write any three applications of optical fibers. [5+5]

8.a) Describe seven crystal systems and their corresponding Bravais lattice. [5+5]  
b) Derive the expression for inter planar spacing of orthogonal crystal system. [5+5]

OR

9.a) Define atomic radius and packing fraction. [4+6]  
b) Estimate the packing fractions of BCC, FCC and HCP crystals. [4+6]

10.a) Describe powder diffraction method to determine the structure of a unit cell. [5+5]  
b) Calculate concentration of Frenkel defects at a given temperature. [5+5]

OR

11.a) Describe the Laue method of X-ray diffraction and mention the limitations. [5+5]  
b) What are line defects? Explain Burger's vector. [5+5]

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