

Code No: 131AH

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, December – 2019/January - 2020

ENGINEERING PHYSICS – I

(Common to EEE, ECE, CSE, EIE, IT, ETM)

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) Mention two applications of diffraction grating. [2]
- b) Light of wavelength 5893\AA is reflected at normal incidence from a soap film of refractive index 1.42. What is the least thickness of the film that will appear dark? [3]
- c) State Law of Malus's. [2]
- d) What is stimulated emission of radiation? [3]
- e) Define Numerical Aperture. [2]
- f) Find the Numerical Aperture and Acceptance angle of an optical fibre if the refractive indices for core and cladding are 1.6 and 1.5 respectively. [3]
- g) Define what are Miller Indices? [2]
- h) Determine the atomic radius of BCC Lattice in terms of Lattice parameter. [3]
- i) What are grain boundaries? [2]
- j) The first order Bragg's reflections of X-rays with Wavelength 0.58\AA are obtained at an angle of 9.15° with the set of parallel planes of a crystal. Calculate the inter planar spacing of the crystal. [3]

PART-B

(50 Marks)

- 2.a) Describe the interference observed when a monochromatic light is reflected from a thin film of uniform thickness and obtain the condition when the film appears dark.
- b) Mention two applications of the phenomenon of interference in thin films. [8+2]

OR

- 3.a) What is diffraction grating ? Describe how the wavelength of the monochromatic light is determined using it.
- b) Find the number of orders visible if the wavelength of the incident radiation is 5000\AA and number of lines on the grating are 1000 in one centimeter. [7+3]

- 4.a) What are Quarter and Half wave plates?
- b) Explain the construction of Quarter and Half wave plates. Mention their uses. [3+7]

OR

5. Explain the construction and working of a semiconductor laser. Discuss the merits and demerits of this laser. [10]

- 6.a) Explain the principle of propagation of light through an optical fibre.
b) What is attenuation in fibres? Discuss about the attenuation of signals in optical fibres.
c) Explain the variation of attenuation of signals in a fibre as a function of wavelength.

[3+4+3]

OR

- 7.a) What are Single Mode, Multi Mode and Graded Index fibres and explain the advantages and limitations of these fibres.
b) Discuss the applications of fibres in medical diagnosis and the field of sensors.

[6+4]

- 8.a) What are Lattice parameters? Define atomic radius, co-ordination number and packing fraction.
b) Calculate the packing fraction of HCP and diamond Lattices.

[5+5]

OR

- 9.a) Explain the procedure to represent a crystal planes in terms of Miller Indices.
b) Derive the expression for the inter planar spacing between the two parallel planes with Miller Indices (h,k,l) for the orthogonal crystal systems.

[4+6]

- 10.a) Why X-rays are used for analysis of Crystal Structures?
b) Describe in detail the powder X-ray diffraction method.

[2+8]

OR

- 11.a) What are Schottky and Frenkel defects?
b) What is Burger's vector and define line defects in terms of Burger's vector.
c) What are Staking faults?

[4+4+2]

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