Code No: 131AH

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year I Semester Examinations, March/April - 2023
ENGINEERING PHYSICS
(Common to EEE, ECE, CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a) An observer through mesh is observing a diffraction pattern in his room due to street light, which type of diffraction is this, explain? [2]
   b) Write uses of interference of light. [3]
   c) Calculate the thickness of a quarter wave plate for μ_e= 1.533 and μ_o= 1.544, $\lambda = 5000 \overset{o}{A}$. [2]
   d) Define the stimulated emission and mention its characteristics. [3]
   e) Classify the optical fibers based on the refractive index of core. [2]
   f) The fractional refractive index of an optical fiber 0.0004 and clad refractive index is 1.48. Calculate numerical aperture of the fiber. [3]
   g) Draw the planes (101) and (100) in a cubic unit cell of unit dimensions. [2]
   h) Obtain the relation between atomic radius 'r' and unit cell edge 'a' for BCC. [3]
   i) Classify the defects in solids. [2]
   j) Write note on grain boundaries. [3]

PART - B

(50 Marks)

2.a) Derive the condition for maxima and minima of interference when a beam of light incident obliquely on a thin transparent parallel film.

   b) A parallel beam of light $5890 \overset{o}{A}$ sticks a film of oil (μ = 1.46) floating on water (μ= 1.33), when viewed at an angle 30^{0} from the normal, eight dark bands are seen. Find the thickness of the film. [7+3]

OR

3.a) Define diffraction grating and discuss the Fraunhofer diffraction at N-slits.
   b) A parallel beam of light is allowed to incident normally on a plane grating having 4250 lines/cm and second order is observed at 30 ^{0}. Find the wavelength of the incident light. [7+3]

4.a) Define double refraction and discuss how polarized light is obtained with Nicol prism.
   b) State and explain the Mauls's law. [7+3]

OR

5.a) Describe the working of semiconductor laser.

 b) Write the characteristics of laser light. [7+3]

6.a) Define acceptance angle of an optical fiber and derive expression for it.

 b) Discuss the advantages of optical fibers as a vehicle of communication over the conventional medium. [7+3]

OR

7.a) Explain the different sources of attenuation in optical fibers and how these can be measured.

 b) Write a note on sensor applications of optical fibers. [6+4]

8.a) Calculate the atomic packing fraction for SC and FCC.

 b) Define Miller indices and mention its features. [6+4]

OR

9.a) Deduce an expression for inter planar spacing of crystal planes.

 b) Calculate the atomic packing fraction for diamond. [5+5]

10.a) Explain the Laue method for X-ray diffraction.

 b) Write note on Edge and screw dislocation. [5+5]

OR

11.a) Define and explain in detail Schottky and Frenkel defects.

 b) Mention the advantages and disadvantages of defects in solids. [6+4]

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