Code No: 152AE **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, June - 2022
APPLIED PHYSICS
(Common to EEE, CSE, IT, CSIT, ITE, CE(SE), CSE(CS), CSE(DS),CSE(Networks))

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Derive an expression for the wavelength λ of the matter waves.
b) Describe an experiment to verify the existence of matter waves. [5+10]

2.a) Explain Heisenberg's Uncertainty principle of position and momentum variables.
b) Write a note on wave particle duality and properties of matter waves. [8+7]

3.a) What are intrinsic and extrinsic semiconductors?
b) Derive an expression for Fermi level in an intrinsic semiconductor and hence show that the Fermi level lies exactly in the middle of the forbidden band. [5+10]

4.a) What is a photo detector? Explain the working principle of semiconductor photodiode.
b) When 3×10^{11} photons each with wavelength of 0.85μm are incident on a photodiode, on average 1.2×10^{11} electrons are generated. Determine the quantum efficiency and responsivity. [8+7]

5.a) Explain the construction, principle and working of Ruby laser.
b) Explain about the different modes that are propagated through step-index and graded index fiber? [10 +5]

6.a) Discuss the concept of Acceptance angle and Acceptance cone of a fiber.
b) Derive a relation between acceptance angle and the refractive indices of core and cladding materials. [8+7]

7.a) What is dielectric polarization? Describe briefly types of polarizations.
b) Derive Clausius-Mosotti relation for dielectric material. [6+9]

8.a) Explain the classification of magnetic materials.
b) When a magnetic material is subjected to a magnetic field of intensity 250 Am^{-1}, its relative permeability is 15. Calculate its magnetization and magnetic flux density. Given that $\mu_o = 4\pi \times 10^{-7}$. [9+6]

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