R18

Code No: 151AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, September/October - 2021
APPLIED PHYSICS
(Common to ECE, EIE, ECM, CSBS, CSE(AI&ML), CSE(IOT))

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

Answer any five questions
All questions carry equal marks
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1.a) Show that the energies of a particle in a one dimensional potential box are quantized.
b) Find the probability of finding a particle between 0.35a and 0.65a where 'a' is the width of the box and particle is in the first excited state. [10+5]

2.a) Describe the Davisson and Germer's experimental for verification of matter waves.
b) Electrons are accelerated through 344 volts and are reflected from a crystal. The first reflection maximum occurs when glancing angle is 60^0. Determine the spacing of the crystal. Given h = 6.62×10^{-34} Joule-sec, e=1.6×10^{-19} C and m_e=9×10^{31}kg. [10+5]

3.a) What is a PN-junction diode? Discuss the V-I characteristics of a diode in both the biasing conditions.
b) Explain advantage of Zener diode over P-N junction diode. [10+5]

4.a) Explain the Hall effect in metal? Derive the formulae to determine Hall coefficient and mobility of electrons.
b) An n-type germanium sample has a donor density of $10^{21}/m^3$. It is arranged in a Hall experiment having magnetic field of 0.5T and the current density is 500 A/m^2. Find the Hall voltage if the sample is 3mm wide. [10+5]

5.a) What is an LED? Explain the working of LED with a neat diagram.
b) Write a short note on solar cell. [10+5]

6.a) What are semiconductor diode lasers? Describe the construction and working of a semiconductor laser with energy band diagram.
b) Discuss advantages of diode lasers over gas lasers. [10+5]

7.a) Draw the block diagram of an optical fibre communication system and explain the function of each block.
b) Consider a fibre having a core of index 1.48, a cladding of index 1.46 and has a core diameter of 30 mm. Show that all rays making an angle less than 9.43^0 with the axis will propagate through the fibre. [10+5]

8.a) State and explain the basic laws of electromagnetism in their integral form.
b) Distinguish between conduction current and displacement current. [10+5]

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