R18

Code No: 151AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year I Semester Examinations, January/February - 2024

APPLIED PHYSICS

(Common to ECE, EIE, ECM, CSBS, CSE (AI&ML), CSE(IOT), AI&DS, AI&ML)

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)	Find the wavelength of an electron moving with velocity of 3×10^7m/s.	[2]
b)	Distinguish the 3 level and 4 level lasers.	[3]
c)	Write the differences of LED and Photo diode.	[2]
d)	Draw the I-V characteristics of diode under forward and reverse bias.	[3]
e)	Distinguish polar and nonpolar dielectrics.	[2]
f)	Write two phenomena where classical theory of physics fails to explain.	[3]
g)	Write the differences between single mode and multi-mode optical fiber.	[2]
h)	Explain the features and applications of radiative and non-radiative semiconductors. Give examples.	[3]
i)	Determine the fraction of electrons in conduction band in silicon at 27^0C and 427^0C. Given Eg=0.7 eV and k=1.38×10^{-23}J/K.	[2]
j)	A magnetic field of 2000A/m produces a magnetic flux of 10^{-5} Wb in an iron bar of cross sectional area 0.1 cm^2. Determine the permeability of iron.	[3]

PART – B

(50 Marks)

2. State and deduce the Heisenberg's uncertainty principle. Write the properties and physical significance of wave functions. Deduce the time independent Schrodinger's equation. [10]

OR

3. Find the wave function of a particle confined in a three dimensional infinite potential. Define tunnel effect for finite potential. [10]

4.a) Explain the conditions of making laser. Give the classification of laser and the block diagram of its working.
b) Write the working of semiconductor laser. [5+5]

OR

5.a) Describe the attenuation of optical fiber.
b) Explain the application of optical fiber for communication and sensor technology. [5+5]

6. Write the Photoconductive and Photovoltaic working mechanism of photodiode. Mention the applications. [10]

OR

7.a) Derive the principle of Light emitting diode for p-n hetro junction. Why it is preferred over homo junction configuration?

b) Estimate quantum efficiency factors of LED. [5+5]

8. Write the construction and working of Bipolar Junction Transistors (BJT). [10]

OR

9. Draw neat energy bands diagram for p-n junction when unbiased, forward biased and reverse biased. Obtain the condition of equilibrium of current when unbiased. How does biasing change this equilibrium and hence explain forward and reverse bias characteristics. [10]

10.a) Write down the Maxwell's Equations and describe their physical significance. Construct the Helmholtz's equation from Maxwell's equations.

b) Deduce the Poynting theorem of electromagnetic field. [5+5]

OR

11.a) What do you mean by internal field? Derive the expression for internal field for solids.

b) Derive Clausius-Mososotti relationship for cubic solids. [5+5]

---ooOoo---