**Code No: 152AE** **R18**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B. Tech I Year II Semester Examinations, September - 2023**

**APPLIED PHYSICS**

**(Common to EEE, CSE, IT, CSIT, ITE, CE(SE), CSE(CS), CSE(DS),CSE(N), CSD)**

**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) Write two phenomena where classical theory of physics fails to explain. [2]
b) Find the wavelength of an electron moving with velocity of $3\times10^6$ m/s. [3]
c) Distinguish the spontaneous and stimulated emissions. [2]
d) Write the differences between single mode and multi-mode optical fiber. [3]
e) Write the differences of LED and Laser Diode. [2]
f) Explains the features and applications of radiative and non-radiative semiconductors. Give examples. [3]
g) Draw the I-V characteristics of Zener diode under forward and reverse bias. [2]
h) Determine the fraction of electrons in conduction band in silicon at 20ºC and 220ºC. Given Eg=1.2 eV and $k=1.38\times10^{-23}$J/K. [3]
i) Distinguish polar and nonpolar dielectrics. [2]
j) A magnetic field of 1800A/m produces a magnetic flux of $3\times10^{-5}$ Wb in an iron bar of cross sectional area 0.2 $cm^2$. Determine the permeability of iron. [3]

**PART - B**

**(50 Marks)**

2.a) State and deduce the Heisenberg's uncertainty principle.
b) Deduce the time independent Schrodinger's equation. [4+6]

**OR**

3.a) Write the properties and physical significance of wave functions.
b) Find the wave function of a particle confined in an one dimensional infinite potential. [3+7]

4.a) Explain the conditions of making laser. Give the classification of laser.
b) Write the working of He-Ne laser. [4+6]

**OR**

5.a) Describe the attenuation of optical fiber.
b) Explain the application of optical fiber for communication and sensor technology. [4+6]

6.a) Write the Photoconductive and Photovoltaic working mechanism of photodiode.
b) Mention the applications of Photoconductive and Photovoltaic Photodiode. [8+2]

**OR**

7.a) Describe working principle and construction of LED.

b) List out application of LED. [5+5]

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

**OR**

9.a) Draw energy bands diagram of a p-n junction at unbiased, forward biased and reverse biased condition.

b) Obtain the condition of equilibrium of current when unbiased. How does biasing change this equilibrium and hence explain forward and reverse bias characteristics. [3+7]

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. [7+3]

**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---**