

R18

Code No: 152AE

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 3×10^6 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 20°C and 220°C . Given $E_g = 1.2$ eV and $k = 1.38 \times 10^{-23}$ J/K. [3]
- i) Distinguish polar and nonpolar dielectrics. [2]
- j) A magnetic field of 1800 A/m produces a magnetic flux of 3×10^{-5} Wb in an iron bar of cross sectional area 0.2 cm². Determine the permeability of iron. [3]

PART - B

(50 Marks)

- 2.a) State and deduce the Heisenberg's uncertainty principle. [4+6]
 - b) Deduce the time independent Schrodinger's equation. [4+6]
- OR**
- 3.a) Write the properties and physical significance of wave functions. [3+7]
 - 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. [4+6]
 - b) Write the working of He-Ne laser. [4+6]
- OR**
- 5.a) Describe the attenuation of optical fiber. [4+6]
 - 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. [8+2]
 - b) Mention the applications of Photoconductive and Photovoltaic Photodiode. [8+2]



OR

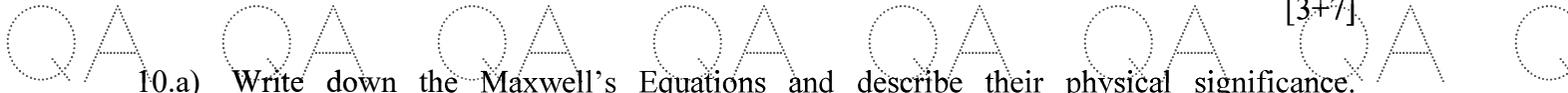
- 7.a) Describe working principle and construction of LED.
- b) List out application of LED. [5+5]



- 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-Mosotti relationship for cubic solids. [5+5]



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