

R22

Code No: 182AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year II Semester Examinations, February - 2025

APPLIED PHYSICS

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

Time: 3 Hours

Max. Marks: 60

Note: This question paper contains two parts A and B.

i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

- 1.a) Write significance of Weins and Rayleigh-Jeans Law. [1]
- b) Define effective mass of an electron. [1]
- c) Why the semiconductors are advantage than conductors in the fabrication of electronic devices. [1]
- d) Draw the energy level diagram of unbiased PN-junction diode. [1]
- e) Define dielectric polarization and polarizability. [1]
- f) Mention the properties of multiferroic materials. [1]
- g) What is nanoscience and technology? [1]
- h) Define quantum confinement. [1]
- i) Write principle of optical fiber. [1]
- j) Classify the optical fibers based on the refractive index of the core. [1]

PART-B

(50 Marks)

- 2.a) Explain the origin of energy bands in solids and classify the solids based on the energy gap.
- b) Discuss the energy levels and wave functions associated with an electron confined in a potential box of length 'L'. [5+5]

OR

- 3.a) Obtain the Schrodinger time independent wave equation.
 - b) Define Heisenberg uncertainty principle and explain its consequences. [5+5]
- 4.a) Explain the classification semiconductors in detail.
 - b) Discuss the direct and indirect band gap semiconductors, what is their role in optoelectronic devices. [5+5]

OR

- 5.a) Describe the structure and working of LED.
- b) Explain the operation of BJT with characteristics. [5+5]

- 6.a) Explain the phenomena of ferroelectricity and mention its applications.
b) Discuss in brief bubble memory devices and magnetic field sensors. [5+5]

OR

- 7.a) Define the phenomena of magnetostriction and magnetoresistance, mention their applications.
b) Write note on super-capacitor. [5+5]

- 8.a) Describe sol-gel method to synthesis nanomaterials.
b) Explain surface to volume ratio and how this ratio influencing the properties of nanomaterials. [5+5]

OR

- 9.a) Describe physical vapor deposition method in detail.
b) Explain the X-ray diffraction method to characterize the materials. [5+5]

- 10.a) Discuss construction and principle of Argon ion laser.
b) Explain the principle and working of semiconductor laser. [5+5]

OR

- 11.a) Describe the construction of optical fiber.
b) Define acceptance angle and derive equation for the acceptance angle of an optical fiber. [4+6]

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