

Code No: 181AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

APPLIED PHYSICS

(Common to CE, ME, ECE, EIE, AE, BT, MIE, PCE, CSE(AI&amp;ML), CSE(IOT), AI&amp;DS, AI&amp;ML)

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) State the Planck's radiation law. [1]
- b) Draw E-K diagram of free electron. [1]
- c) Why silicon is not used to make LED? [1]
- d) Write the difference of Diode and Zener Diode. [1]
- e) Distinguish polar and nonpolar dielectrics [1]
- f) Write the significance of hysteresis loop in magnetism. [1]
- g) Classify the Nanomaterials according to Quantum confinement. [1]
- h) Mention the nanoscale for which a material can be called as nanomaterial. [1]
- i) Give an example of each atomic laser and molecular laser. [1]
- j) Which optical fiber is used for long distance communication? [1]

**PART - B****(50 Marks)**

- 2.a) Explain the concept of the Heisenberg's uncertainty principle. Using Heisenberg's uncertainty principle, prove that electron cannot stay in the nucleus of an atom.
- b) Describe the findings of photoelectric effect.
- c) How does the classical theory fail to explain the photoelectric effect? [5+2+3]

**OR**

- 3.a) What does it mean by free and bound electrons? Discuss the important postulates of free electron theory of metals.
- b) Explain the Bloch's theorem and show how it leads to energy band structure of solids. [5+5]

- 4.a) Derive voltage expression and working of the Bipolar Junction Transistor (BJT).
- b) Describe construction and principle of LED. [5+5]

**OR**

- 5.a) Describe the I-V characteristics of solar cell and photo diode.  
b) Write the working principle of PIN and Avalanche photo detectors. [5+5]

- 6.a) What do you mean by internal field? Derive the expression for internal field for solids.  
b) Derive Clausius-Mosotti relationship for cubic solids. [7+3]

**OR**

- 7.a) Analyse the working of liquid crystal display.  
b) Analyse the working and characteristics of solid fuel cells. [5+5]

- 8.a) Define bottom-up fabrication method of nano materials.  
b) Explain Sol-Gel synthesis for producing nanomaterials with proper diagram of each steps. [3+7]

**OR**

- 9.a) How the characterization techniques XRD and SEM are used for nanomaterials? Explain.  
b) Write application of nanomaterials for medical technology and civil engineering. [7+3]

- 10.a) Describe construction and working mechanism of Argon ion Laser.  
b) Write a note on optical fiber for communication system. [5+5]

**OR**

- 11.a) With neat diagram, explain Nd: YAG laser system.  
b) Explain construction of optical fiber. [6+4]

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PAPERS 2024