Code No: 181AA **R22**

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&ML), CSE(IOT), AI&DS, AI&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 stature 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-Mososotti 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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