Code No: 181AA **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year I Semester Examinations, January/February - 2025

APPLIED PHYSICS

(Common to CE, ME, ECE, 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)	If the energy of a particle is reduced to half then find the percentage increase in the de-Broglie wavelength is about.	[1]
b)	The total probability of finding material particle in given space must have what value for wave function to be normalized?	[1]
c)	Write one important application of BJT.	[1]
d)	Give one example of each type of intrinsic and extrinsic semiconductor.	[1]
e)	What is the function of ferroelectric material?	[1]
f)	What is the use of Bubble memory devices?	[1]
g)	What is critical length of nano material?	[1]
h)	What are size dependent properties of solid?	[1]
i)	Give one example of molecular laser.	[1]
j)	What is the impact of loss in optical fiber?	[1]

PART - B

(50 Marks)

2. Discuss Kronig-Penny model. Using this model show that the energy spectrum of electron consists of a number of allowed energy bonds separated by forbidden regions. [10]

OR

3.a) Analyze the observations of Black body radiations and how does classical theory fail to explain it?

b) How is the Plank's radiation law established on the observations of Black body radiations? [5+5]

4.a) What do you mean by mobility of semiconductor? Derive an expression for the mobility.

b) Write construction, principle of operation, characteristics and application of P-N junction diode. [5+5]

OR

5.a) Analyze the structure, materials, working principle and characteristics of Solar cell.

b) Describe the structure, materials, working principle and characteristics of Avalanche Photo Diode. [5+5]

6.a) Distinguish between solid and liquid electrolytes.

b) Analyze the construction and working principle of solid fuel cell. [5+5]

OR

7.a) Describe the property of Piezo electric material. Using it how a crystal oscillators are made.

b) Analyze the construction and working of Liquid Crystal Display. [5+5]

8.a) Write short notes on:
i) Ball milling ii)) Sol-gel

b) Analyze the X-ray diffraction technique for the characterisation of nanoparticles. [5+5]

OR

9.a) How does the scanning tunnelling microscopy work?

b) How does electron microscopy technique used for characterisation of nano-particles? [5+5]

10.a) Explain the following terms:
(i) Spontaneous emission (ii) Stimulated emission.

b) How Optical fibers are used in optical communication? Give proper working methodology of fiber optic communication. [5+5]

OR

11.a) Estimate the numerical aperture of Optical fiber.

b) Explain the principle, construction and working Nd:YAG laser. [5+5]

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