Code No: 182AB **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year II Semester Examinations, January/February - 2024
APPLIED PHYSICS
(Common to EEE, CSE, IT, CSIT, 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)	Draw the Black body radiation graph and mark which part of this graph is matched with Wein's law.	[1]
b)	Write the key feature of Fermi-Dirac distribution?	[1]
c)	Write two applications of Hall effect.	[1]
d)	Write the main difference of PIN and Avalanche photo diode.	[1]
e)	Write two features of Pyroelectric materials.	[1]
f)	Write an application of bubble memory device.	[1]
g)	Define top-down fabrication of nanomaterials. Give example.	[1]
h)	Mention two application of nanomaterial for biology.	[1]
i)	What are the wavelengths of CO_2 and He-Ne laser?	[1]
j)	Which physical phenomena is behind the working of optical fiber?	[1]

PART - B

(50 Marks)

2.a) What are the Born interpretation of the wave function?
b) Derive the time independent Schrodinger wave equation. Find the energy states of a mass particle in side one dimensional potential well. [3+7]

OR

3.a) Derive and explain the Durde Free electron.
b) Write the significance of E-K diagram and define effective mass. Draw and explain the E-K diagram of electron confined in atomic potential. [4+6]

4.a) Explain in brief the concept of Fermi level. Derive an expression for in intrinsic and extrinsic semiconductor.
b) How does the Fermi level changes with temperature for semiconductors? [5+5]

OR

5.a) Explain construction and working principle of LED.
b) A LED radiates at 1300 nm. If the forward current in the LED is 10 mA, calculate the power output, assuming an internal quantum efficiency of 1%. [7+3]

6.a) Explain the classification of magnetic materials.
b) Explain the Hysteresis curve of ferromagnetic materials.
c) Write the features and applications of soft magnetic materials with proper examples. [4+3+3]

OR

7.a) Analyze the conductivity responses of liquid and solid electrolytes.
b) Explain the conditions and features of superionic conductors. [5+5]

8.a) Classify the nanomaterials according to quantum confinements.
b) Explain how to characterize a nanomaterial with Scanning Electron Microscope (SEM) with neat sketch. . [3+7]

OR

9.a) Analyse the impact of surface to volume ratio for nanomaterials.
b) Write working principle of sol-gel and ball milling technique to produce nanomaterials. Mention the merits and demerits of both the methods. [3+7]

10.a) Write six features of laser.
b) Write the working principle and constructions of Nd-YAG laser and its applications. [5+5]

OR

11.a) Describe the construction of optical fiber.
b) Mention the classifications of optical fibers.
c) Derive the numerical aperture of a multimode optical fiber. [3+3+4]

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