Code No: 151AE **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech I Year I Semester Examinations, March/April - 2023
APPLIED PHYSICS
(Common to ECE, EIE, ECM, CSBS, CSE(AI&ML), CSE(IOT), AI&DS, AI&ML)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What do you mean by duel nature of matter?	[2]
b)	Describe Compton Effect.	[3]
c)	What is Hall Effect?	[2]
d)	Differentiate between drift and diffusion current.	[3]
e)	Draw the I-V characteristics of a solar cell and explain.	[2]
f)	Discuss the Avalanche breakdown and zener breakdown.	[3]
g)	State important characteristics of laser beam.	[2]
h)	What are the differences between step-index and graded-index fiber.	[3]
i)	An electromagnetic wave carries momentum. What it signifies?	[2]
j)	What is hysteresis loop? What does it represent?	[3]

PART - B

(50 Marks)

2.a) Derive an expression for the frequency of the scattered photon in terms of the frequency of the incident radiation and scattering angle.
b) Will photoelectrons be emitted by a copper surface of work function 4.4 eV, when illuminated by visible light? Prove. [7+3]

OR

3.a) What are the properties of black body radiation?
b) Arrive at Heisenberg's Uncertainty principle with the help of a thought experiment. [4+6]

4.a) What is Zener diode? Explain the operation of a Zener diode in forward and reverse bias condition.
b) Explain how a Zener diode maintains constant voltage across the load. [7+3]

OR

5.a) Explain with neat sketch the energy band diagram of unbiased transistor.
b) Explain the formation of depletion region of PN junction diode. [6+4]

6.a) Discuss various types of semiconductor lasers.
b) Give a brief note on the principle, construction and working of LED. [3+7]

OR

7.a) Explain the principle and working of PIN photodiode.
b) What are the characteristics of photo-detectors? Discuss. [6+4]

8.a) Explain the principle, construction and working of He-Ne laser.
b) An optical fiber has an numerical aperture of 0.20 and a cladding refractive index of 1.59. Determine the acceptance angle for the fiber in water. (Refractive index of water is 1.33). [7+3]

OR

9.a) Explain the propagation mechanism of meridional and skew rays in optical fibres.
b) A He-Ne laser emits light at a wavelength of 632.8 nm and has an output power of 2.3 mW. How many photons are emitted by this laser in a minute? [6+4]

10.a) Making use of Maxwell's equations, obtain the differential equation for an electromagnetic wave.
b) State Ampere's law and get an expression for "continuity equation". [7+3]

OR

11.a) Discuss the classification of magnetic materials on the basis of their magnetic properties.
b) A magnetic field of 1800A/m produces a magnetic flux of 3×10^{-5}Wb in an iron bar of cross sectional area 0.2cm^2. Calculate permeability. [7+3]

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