R18

Code No: 152AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

APPLIED PHYSICS

(Common to EEE, CSE, IT, CSIT, ITE, CE(SE), CSE(CS), CSE(DS), CSE(N), CSD)

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)	Define a matter wave and obtain expression for its wavelength.	[2]
b)	Find the energy difference between the ground and first excited state of an electron confined in a potential box of length 1nm.	[3]
c)	Draw the V-I characteristics of Zener diode.	[2]
d)	Explain the drift and diffusion current in semiconductor	[3]
e)	List out applications of direct band gap semiconductors.	[2]
f)	Explain the principle of semiconductor laser.	[3]
g)	What is pumping and classify the various pumping mechanisms.	[2]
h)	Write applications of optical fibers.	[3]
i)	Classify the magnetic materials based on the susceptibility.	[2]
j)	Write differential form of Maxwell's equations.	[3]

PART - B

(50 Marks)

2.a)	Derive the wave functions and energy levels associated with an electron confined in a 1-D potential box of length 'L'.	
b)	Explain the Uncertainty principle and its consequences.	[6+4]

OR

3.a)	Discuss, how Plancks law explain the radiation of a blackbody.	
b)	Define photoelectric effect and explain Einstein equation for photoelectric effect.	[6+4]
4.a)	Define Hall effect and derive equation for Hall coefficient.	
b)	Explain the junction potential of a PN junction diode subjected to forward and reverse bias.	[6+4]

OR

5.a)	Explain the working bipolar junction transistor and mark its current components.	
b)	Write a note on intrinsic and extrinsic semiconductor.	[6+4]

6.a) Explain in detail about radiative and non-radiative recombination process in semiconductors, and for LED materials which type of recombination is being take place.

b) Discuss the different materials used for LED and semiconductor lasers. [6+4]

OR

7.a) Discuss the construction and working of a solar cell with its characteristics.

b) Draw the characteristics of PIN diode and explain. [6+4]

8.a) Describe the working of Ruby laser with energy level scheme.

b) Write the applications of lasers. [6+4]

OR

9.a) Define numerical aperture of an optical fiber and derive equation for it.

b) Discuss the various sources for the attenuation of signal in optical fibers. [6+4]

10.a) Define internal field in dielectric medium and derive the equation for internal field of a dielectric.

b) Define ferroelectricity and explain the properties of ferroelectric materials. [6+4]

OR

11.a) Discuss the domain theory of ferromagnetism.

b) Draw the behavior of ferromagnetic materials in the presence of magnetic field and mention various parts of it. [6+4]

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