JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, May/June - 2019
APPLIED PHYSICS
(Common to ECE, EIE)

Time: 3 hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a)	What is the concept of black body radiation?	[2]
b)	What is the importance of Fermi level?	[2]
c)	What is the basic principle of LED's?	[2]
d)	Explain the dispersion losses in optical fiber?	[2]
e)	What are the differences between polar and non-polar dielectrics?	[2]
f)	Explain the wave-particle duality?	[3]
g)	What is the Hall effect?	[3]
h)	What is the recombination mechanism in semiconductors?	[3]
i)	What is the laser? Explain its principle.	[3]
j)	State Ampere's law in differential and integral forms?	[3]

PART-B
(50 Marks)

2.a) What are essential physical assumptions needed to explain the characteristics of Photoelectric effect?
   b) Derive time independent of Schrodinger's wave equation for a free particle.
   c) Calculate the deBroglie wavelength of the neutron of energy 28.85 eV.   [10]

OR

3.a) Briefly explain about the Compton effect.
   b) State and explain the Heisenberg's uncertainty principle.
   c) Find the lowest energy of an electron confined in a box of side 0.1 nm each.   [10]

4.a) Distinguish between the intrinsic and extrinsic impurity semiconductors.
   b) Derive an expression for the density of holes in intrinsic semiconductors.
   c) Explain I-V characteristics of zener diode.   [10]

OR

5.a) Explain the variations of Fermi level with temperature in the case of n-type semiconductors.
   b) How the PN junction diode is formed? Explain the rectifying action of PN junction diode?
   c) Write a detailed note on BJT.   [10]

6.a) Explain the radiative and non radiative recombination mechanism in semiconductors?
 b) Explain the construction and working principle of PIN photo diode detector.
 c) Discuss about the semiconductor laser. [10]

OR

7.a) What are the advantages and disadvantages of LED in electronic display?
 b) Write a detailed note on avalanche photo diode detector.
 c) What is the basic principle of the solar cell? Explain the I-V characteristics of solar cell. [10]

8.a) Distinguish between the spontaneous and stimulated emission processes of light.
 b) What do you understand by population inversion? How is it achieved?
 c) With necessary energy level diagram explain the working of a Helium –Neon laser. [10]

OR

9.a) Explain briefly basic principle of optical fiber.
 b) Derive an expression for the numerical aperture and acceptance angle.
 c) Describe graded index fiber and explain the transmission of signal through it. [10]

10.a) Write the Maxwell equations integral and differential forms. Explain the physical significance of each.
 b) The dielectric constant of He gas at NTD is 10000684. Calculate the electronic polarazability of He atoms if the gas contains 2.7×10^{25} atoms per m^3?
 c) What is Bohr magneton? How it is related to magnetic moment of electron. [10]

OR

11.a) What is electric current? Derive an expression for the continuity equation.
 b) Derive an expression for the Claussius-Mossotti relation equation.
 c) Explain how the ferrites superior to ferromagnetic materials. [10]

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