R18

Code No:151AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B .Tech I Year I Semester Examinations, December - 2018
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) State the principle of uncertainty. [2]
b) What is reverse saturation current? [2]
c) Write any two characteristics of PIN photodiode. [2]
d) How laser beam achieves coherence? [2]
e) Why susceptibility of diamagnetic materials is negative. [2]
f) What is a blackbody? State Planck's hypothesis. [3]
g) Explain Fermi level dependence on carrier concentration. [3]
h) A light emitting diode is made of GaAsP having a band gap of 1.9 eV. Determine the wavelength of the radiation emitted. [3]
i) Differentiate graded index fibres from step index fibres. [3]
j) Write a short note on piezoelectric materials. [3]

PART – B

(50 Marks)

2.a) Derive one-dimensional time–independent Schrodinger wave equation for an electron.
b) Calculate the velocity and kinetic energy of an electron of wavelength 1.66 Å. [7+3]

OR

3.a) Explain Compton effect and derive expression for Compton shift.
b) X-ray photon wavelength 0.3 Å is scattered through an angle 45^0 by a loosely bound electron. Find the wavelength of scattered photon. [7+3]

4.a) With the help of schematic diagram, explain construction and principle of operation of bipolar junction transistor.
b) Discuss any three applications of Hall effect. [7+3]

OR

5.a) With neat plots describe V-I characteristics of a Zener diode in both biasing conditions.
b) Explain the formation of potential barrier across the p-n junction. [7+3]

6.a) What are photodiodes? Explain working principle and structure of Avalanche photodiode.

b) Explain recombination mechanism in semiconductors. [7+3]

OR

7.a) Explain with neat diagram, the construction and working of solar cell. State few disadvantages of solar cell.

b) With relevant plots, explain V-I characteristics of a solar cell. [7+3]

8.a) Derive the relationship between Einstein's coefficients and explain their physical significance.

b) Explain the applications of lasers in medicine. [7+3]

OR

9.a) Derive an expression for acceptance angle for an optical fibre. How is it related to numerical aperture?

b) Find the numerical aperture and acceptance angle of a fibre of core index 1.4 and fractional refractive indices 0.002. [7+3]

10.a) Explain the term internal field. Derive an expression for internal field in the case of one dimensional array of atoms in dielectric solids.

b) Deduce Claussius-Mossotti relation for dielectrics. [7+3]

OR

11.a) Classify the magnetic materials based on atomic point of view.

b) State and explain Ampere's circuital law. [7+3]

---ooOoo---