

UNIT - IV

8. Explain in detail about Knott-Penry Model for the origin of energy band theory and also write its consequences. 15

9. Write short notes on any two 2 × 7.5 = 15

(a) Carrier Generation and Recombination

(b) Drift and Diffusion

(c) PN Junction diode

Roll No. _____

3002

B. Tech. (EE) 1st Semester
Examination – February, 2022

WAVES AND OPTICS & QUANTUM MECHANICS

Paper : BSC-PHY-102-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all and each question carry equal marks. Select only one question from each Unit but 1st question is compulsory.

1. Attempt any six questions : 2.5 × 6 = 15

(a) Define total internal reflection and write its conditions.

(b) What do you mean by division of amplitude and division of wave front ?

3002

(P-4)/(Q-9)/(22)

(4)

3002: 750-(P-4)/(Q-9)/(22)

P. T. O.

- (c) Explain mechanical and non-mechanical waves and give their examples.
- (d) Write down de-Broglie hypothesis and formula of de-Broglie wavelength.
- (e) Explain N-type and P-type semiconductor and draw their energy band diagram.
- (f) Define wave packet and group velocity.
- (g) What do mean by population inversion and monochromaticity.
- (h) Define Fermi energy level and write Fermi-Dirac Distribution function.

UNIT - I

- 2. Write the differential equation for the damped harmonic oscillations of a particle and solve it. Give the condition for over damping, critical damping and under damping action. 15
- 3. (a) Discuss the motion of transverse wave on a string and derive its velocity. 10
- (b) Write short notes on acoustics waves. 5

3002- (P-4)(O-9)(22) (2)

- 4. Define diffraction grating. Draw neat diagram of diffraction pattern formed by grating and explain it mathematically. 15
- 5. (a) Define stimulated absorption, spontaneous emission and stimulated emission and derive the relation between Einstein's co-efficients. 10
- (b) Explain any two important characteristics of Laser. 5

UNIT - III

- 6. (a) Derive Schrodinger time independent and dependent wave equations. 10
- (b) Write important properties of wave function. 5
- 7. (a) Obtain Schrodinger's wave equation for a particle in square well potential and discuss the energy levels when the well is infinitely deep. 10
- (b) Write down major differences between classical and quantum mechanics. 5

3002- (P-4)(O-9)(22) (3) P. T. O.