

24/2/23

National Institute of Technology, Hamirpur (HP)

End Semester Examination - February, 2023

Course - B.Tech.

Semester - 1st

Subject Code - PH-101

Subject Name - Engineering Physics

Maximum Marks: 50

Time: 3:00Hour

All questions are compulsory

Q 1:

- a) Write Faraday's law of electromagnetic induction. (1)
- b) Condition for spontaneous emission to dominate the stimulated emission. (1)
- c) What is numerical aperture of optical fiber? (1)
- d) Does charges from outside contributes to the flux through a closed surface? (1)
- e) Does magnetic monopole exist? (1)
- f) Write the momentum for free particle on which no external force is applied. (1)
- g) Which impurities are added for n-type semiconductors. (1)
- h) Which type of semiconductor materials are used for laser diode? (1)
- i) What is attenuation in optical fiber? (1)
- j) What is piezoelectric effect? (1)

Q 2: At what temperature we can expect 10% probability that electron in silver have an energy which is 1% above the Fermi Energy? The Fermi energy of silver is 5.5eV. (5)

Q 3: For a graded index fiber $n_1 = 1.487$ and $\Delta = 1.71\%$ for a link 5km in length, compute the pulse broadening/spreading, due to intermodal dispersion and determine the maximum bit rate per kilometer (data transfer rate). (5)

Q 4: What was the discrepancy in Ampere's law. How Maxwell modified it. (5)

Q 5: Drive that electric field and magnetic field components are perpendicular to each other and travel velocity of light in free space. (5)

Q 6: Write principle, working and energy level diagram of He-Ne Laser and its advantages over Ruby Laser. (5)

Q 7: What is superconductivity? Discuss the factors that affects the superconductivity. (5)

Q 8: Drive an expression for Energy of a free particle confine to one dimensional infinite potential well. (5)

Q 9: Can any wave with frequency above 20KHz is ultrasonic? Discuss one method for generation of ultrasonic. (5)
