Seat No: _____   Enrollment No: _____

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2018 - 19 Examination

Semester: 1   Date: 11/12/2018
Subject Code: 203192105   Time: 2:00pm to 4:30pm
Subject Name: Engineering Physics   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions (All are compulsory) (Each of one mark)   **(15)**

1. _____ occurs while a system (such as a group of atoms or molecules) exists in a state in which more members of the system are in higher, excited states than in lower, unexcited energy states.
    - I.   Pumping
    - II.   Population inversion
    - III. Lifetime
    - IV.   None of these

2. _____, phenomenon in which electrically charged particles are released from or within a material when it absorbs electromagnetic radiation.
    - I.   X Ray Diffraction
    - II.   Photoelectric effect
    - III. Meisner Effect
    - IV.   Compton Effect

3. _____ is a phenomenon in which the atoms of a crystal, by virtue of their uniform spacing, cause an interference pattern of the waves present in an incident beam of X rays.
    - I.   X rays Diffraction.
    - II. Interference
    - III. Meissner effect
    - IV. None of the above

4. The expulsion of magnetic flux when a material becomes superconducting in a magnetic field is known as _____.
    - I.   Meissner Effect.
    - II. Cooper effect.
    - III. Diamagnetism
    - IV. None of the above

5. _____ is a figure of merit of how much light is collected by the optical system such as optical fiber.
    - I.   Acceptance angle.
    - II. Numerical aperture.

6. Principle of optical fibre is _____

7. Principle of laser is

8. Type-2 superconductor is pure superconductor. **True or False**

9. Black body radiation is the particle radiation **True or False**

10. All the unit cell are primitive lattice. **True or False**

11. Define metastable.

12. Define acceptance angle.

13. Define bandgap.

14. Define photoelectric effect.

15. Pictorially represent body centered cubic.

Q.2 Answer the following questions. (Attempt any three) **(15)**

    A) Write 10 application on optical fibre.

    B) Define stimulated emission , population inversion , three level pumping , optical resonator and spontaneous emission.

    C) Explain intrinsic and extrinsic semiconductor in detail and draw energy bandgap diagram of insulator , conductor and semiconductor.

    D) Explain powder method.

Q.3 A) Explain any one solid laser in detail with all necessary diagram. **(07)**

    B) 1) Explain wave particle duality and hydrogen atom model. **(06)**

       2) Draw structure and write packing fraction of face centered cubic body **(02)**

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OR

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    B) 1) Write 10 application on superconductor. **(05)**

       2) Define miller indices , diffraction and bragg's law. **(03)**

Q.4 A) 1) Calculate the critical current and current density for a wire of a lead having a diameter of 1 mm at 4.8 K. The critical temperature for lead is 9K and $H = 8 \times 10^4 \, A \, m^{-1}$. **(03)**

       2) A step-index fiber has a core index of refraction of $n_1 = 2.1$ The cut-off angle for light entering the fiber from air is found to be 10.50°. (a) What is the NA of the fiber? (b) What is the index of refraction of the cladding of this fiber? (c) If the fiber were submersed in water, what would be the new numerical aperture and cut-off angle? **(04)**

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OR

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    A) Derive time dependent schrodinger equation in one and three dimension. **(07)**

    B) Explain carrier concentration in intrinsic semiconductor and derive the total current in Semiconductor. **(08)**