

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

Semester: 1  
Subject Code: 203192105  
Subject Name: Engineering Physics

Date: 16/05/2019  
Time: 02:00 pm to 04:30pm  
Total Marks: 60

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**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. A \_\_\_\_\_ is an optical fiber whose core has a refractive index that decreases with increasing radial distance from the optical axis of the fiber.
  - I. Graded Index
  - II. Step Index
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. Meissner 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 superconductor 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)

**OR**

- 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  $H = 8 \times 10^4 \text{ A m}^{-1}$ . (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  $10.50^\circ$ . (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)

**OR**

- 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)