Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Sem.–1,2) INTRODUCTION TO PHYSICS : BIOTECHNOLOGY Subject Code : BTPH-107-18 M.Code : 75369 Date of Examination : 20-01-23

Time: 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION B & C have FOUR questions each.
- 3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
- 4. Select atleast TWO questions from SECTION B & C.

SECTION-A

1. Answer briefly:

- a) Explain briefly the difference between spontaneous and stimulated emission of radiation.
- b) State the necessary condition for Optical Fibre Communication.
- c) Define the magnetic susceptibility (χ_m) of a magnetic material.
- d) What are ferrite materials?
- e) Explain the phenomena of magnetostriction.
- f) Differentiate between hard and soft X-rays.
- g) Give the adverse effects of ultrasound waves.
- h) Explain the concept of wave-particle duality.
- i) In an experiment, tungsten cathode has a threshold wavelength 2400Å is irradiated by ultraviolet light of wavelength 1800Å. Calculate the maximum energy of emitted photo-electrons.
- j) What do understand by a quantum well?

SECTION-B

- 2. Describe the construction and working of He-Ne Laser with proper energy level diagram. Explain the role of Neon atoms in He-Ne Laser.
- 3. a) Differentiate between the step-index and graded-index multimode fibre.
 - b) Discuss the attenuation and dispersion of signals in optical fibre.
- 4. a) Differentiate paramagnetic, diamagnetic and ferromagnetic substances by illustrating simple experiments.
 - b) Discuss hard and soft magnetic materials with applications.
- 5. a) What is Meissner effect? Show that superconductors are perfect diamagnets.
 - b) Give a qualitative explanation of the BCS theory of superconductors.

SECTION-C

- 6. a) Explain and derive Bragg's law. Also give its applications in crystallography.
 - b) The wavelengths of first-order X-rays are 2.20A at 30°. Find the distance between the adjacent crystal planes.
- 7. Explain the Doppler's principle of sound. Explain the properties of ultrasound waves and its propagation in biological tissues.
- 8. a) Derive Einstein's photoelectric equation. How does it explain the laws of photoelectric emission?
 - b) Why Compton Effect is not observable with Visible Light?
- 9. What are Carbon nanotubes? Explain their types, properties, and applications.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.