

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--

**Question Paper Code: 41003**

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

First Semester

Civil Engineering

14UPH103 – ENGINEERING PHYSICS

(Common to ALL branches)

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

- \_\_\_\_\_ crystal is used to produce longitudinal ultrasonic waves  
(a) X-cut                      (b) Y-cut                      (c) Z-cut                      (d) XY-cut
- \_\_\_\_\_ is use to measure the depth of sea directly  
(a) Echo meter              (b) SONAR                      (c) both a and b              (d) Laser
- The rate of stimulated emission is equal to \_\_\_\_\_  
(a)  $R_{21}(ST) = B_{21} N_1 N_2$                       (b)  $R_{21}(ST) = B_{21} \rho \gamma N_1$   
(c)  $R_{21}(ST) = B_{21} \rho \gamma N_2$                       (d) none of these
- The principle of semi conductor laser is  
(a) Forward biased                      (b) Reverse biased  
(c) Energy of photons                      (d) None of these
- The principle of propagation of light through optical fibre is  
(a) Total Internal Reflection                      (b) Refraction  
(c) Diffraction                      (d) Reflection

6. In an optical fibre, the inner core is \_\_\_\_\_ the cladding  
 (a) denser than (b) less denser than  
 (c) the same density as (d) 2 times denser than
7. In Compton scattering, at what angle of scattering, the wavelength of the scattered photon will be maximum  
 (a)  $0^\circ$  (b)  $90^\circ$  (c)  $180^\circ$  (d)  $120^\circ$
8. In electron microscope the focussing effect is due to  
 (a) Lens (b) Electromagnetic field  
 (c) Prism (d) Aperture
9. Which of the following has simple cubic structure?  
 (a) Copper (b) Aluminium (c) Magnesium (d) Polonium
10. The primitives are equal and interfacial angles are equal to  $90^\circ$  is called  
 (a) Cubic (b) mono clinic (c) Tri clinic (d) hexagonal

PART - B (5 x 2 = 10 Marks)

11. What is cavitation?
12. Explain the term population inversion.
13. What is meant by fibre optic sensor?
14. What are degenerate energy levels?
15. Define: Bravais Lattice.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Find the depth of a submerged submarine if an ultrasonic wave is received after 0.33 sec from the time of transmission. Given: The velocity of ultrasonic waves in sea water = 1440 m/s. (4)
- (ii) Explain with neat sketch, the construction and production of ultrasonic waves using piezoelectric oscillator. (12)

Or

- (b) (i) Discuss the action of A and B scan in detail. (8)  
(ii) Describe the action of ultra sonogram with neat diagram. (8)
17. (a) (i) Distinguish between spontaneous emission and stimulated emission. (4)  
(ii) Explain the modes of vibrations of  $CO_2$  molecules. Describe the construction and working of  $CO_2$  laser with necessary energy level diagrams. (12)

Or

- (b) (i) Discuss the construction and working of the Homo Junction Semiconductor Laser. (10)  
(ii) What is Holography? Explain the construction and reconstruction of a Hologram. (6)
18. (a) (i) Derive an expression for acceptance angle and numerical aperture in optical fiber. (10)  
(ii) Write a note on different losses in optical fiber. (6)

Or

- (b) (i) Explain the construction and working of displacement sensor. (6)  
(ii) Explain the different types of losses in fiber optic transmission. (10)
19. (a) (i) State Wien's displacement law and Rayleigh – Jeans' Law. (4)  
(ii) Derive the expression for time dependent and time independent Schrodinger equation. (12)

Or

- (b) (i) Write a short note on physical significance of wave function. (4)  
(ii) Explain the construction and working of Scanning Electron microscope with neat diagram. (12)
20. (a) Describe HCP structure. Give details about number of atoms per unit cell, coordination number, atomic radius, axial ratio and packing factor. (16)

Or

- (b) Explain with neat sketches the different types of crystal defects. (16)

