

**B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2020 (Held during April, 2021)**

Semester - I

**PH18151- Engineering Physics**

(Regulation 2018)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. An Orthorhombic crystal system is represented by  
(a)  $a=b=c, \alpha=\beta=\gamma=90^\circ$  (b)  $a\neq b\neq c, \alpha=\beta=\gamma=90^\circ$  (c)  $a\neq b\neq c, \alpha=\beta=\gamma\neq 90^\circ$  (d)  $a\neq b\neq c, \alpha\neq\beta=\gamma=90^\circ$
2. Which of the following causes Acoustic grating?  
(a) Magnetic waves (b) Ultrasonic waves (c) Electric waves (d) Transverse waves.
3. Energy required per unit mass of substance to raise its temperature by 1K is called  
(a) Enthalpy (b) Internal energy (c) Specific heat capacity (d) Thermal diffusivity.
4. The refractive index \_\_\_\_\_ varies in Graded Index optical fibre  
(a) Tangentially (b) Radially (c) Longitudinally (d) Transversely
5. An ultrasound pulse sent by a source is reflected by a submerged target at a distance 597.50m and reaches the source after 0.83 second. Find the velocity of ultra sound in sea water.
6. What is meant by normalization of wave function?
7. State Weber-Fechner law.
8. How are Fibre optic sensor classified?

**PART B - (4 X16 = 64 marks)**

09. (a) (i) Show that for a cubic structure of a “crystal system”, the interplanar distance ‘d’ is related to miller indices and cell edge length. (6)  
(ii) Calculate the number of atoms per unit cell, coordination number and Packing factor of Simple cubic, Body Centred Cubic and Face Centred Cubic structures of a “crystal system”with examples. (10)  
(OR)
- (b) (i) Describe with necessary theory of Lee’s disc method for determination of Thermal conductivity of a bad conductor. (10)  
(ii) Derive an expression for effective thermal conductivity of compound media connected in series. (6)
10. (a) (i) What is Compton Effect? Derive an equation for Compton shift. Explain the experimental verification of Compton Effect with the diagram. (16)  
(OR)
- (b) (i) Derive an expression for Schrödinger’s Time-independent wave equation. (6)

- (ii) Deduce an expression for energy levels and wave function of a particle enclosed in one-dimensional potential box of width “a” and infinite height. **(10)**

11. (a) (i) Derive an expression for Reverberation time of a hall using growth and decay of sound energy density inside a hall. **(16)**

**(OR)**

- (b) (i) What are Ultrasonic waves and its properties? **(4)**  
Explain with neat circuit, the generation of ultrasonic waves using Quartz crystal **(12)** and explain its advantage over generation of ultrasonic waves using Ferromagnetic rod.

12. (a) (i) Distinguish between Spontaneous and stimulated emission of Lasers. **(4)**  
(ii) Describe the construction and working of Four level solid state Nd:YAG laser with necessary diagram. **(12)**

**(OR)**

- (b) (i) Describe the propagation of light through optical fibre and obtain an expression for Numerical Aperture and Acceptance angle. **(10)**  
(ii) Explain the fibre optical communication system with a neat block diagram. **(6)**