Q. Code: 380628

Reg. No. | | | | | | | | | | | | | |

B.E./ B.TECH. DEGREE EXAMINATIONS, MAY 2023

First Semester

PH22153 – TECHNICAL PHYSICS

(Common to BT & CH)

(Regulation2022)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Develop and understanding of photonic and fiber optic communication system	**4**
CO 2	Acquire the knowledge of quantum mechanics	**4**
CO 3	Classify and demonstration of the function of crystal and their defects	**3**
CO 4	Acquire the knowledge of new engineering Materials	**3**
CO 5	Enable to explore how the sound is produce and propagated in material medium	**3**

PART- A(20x2=40Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	What is population inversion?	**1**	**2**
2.	What is the term 'active medium' in Laser?	**1**	**2**
3.	Mention the conditions to be satisfied for total internal reflection.	**1**	**2**
4.	Calculate the numerical aperture of an optical fiber whose core and cladding are made of material of refractive index 1.6 and 1.5 respectively.	**1**	**3**
5.	Find the change in wavelength of an X-ray photon when it is scattered through an angle of 90° by a free electron.	**2**	**3**
6.	Write the physical significance of the wave function.	**2**	**3**
7.	Write the expression for the Schrodinger time-independent and time dependent wave equation.	**2**	**2**
8.	Evaluate the energy of an electron confined in a box of width 2 Å for the first excited state.	**2**	**3**
9.	Define unit cell.	**3**	**2**
10.	Show the atomic positions in FCC and HCP crystal structures in a sketch.	**3**	**2**
11.	A crystal plane cut at 3a, 4b and 2c distances along the crystallographic axes. Find the Miller Indices of the plane.	**3**	**3**
12.	What are Schottky defects?	**3**	**2**
13.	What are shape memory alloys? What are their properties.	**4**	**2**
14.	What are biomaterials and what are they used for?	**4**	**2**
15.	List the synthesis method of Nanomaterials.	**4**	**2**
16.	Explain the importance of mechanical properties of nanophase materials.	**4**	**2**

17.	Define reverberation time of an auditorium.	**5**	**2**
18.	Give the relation between loudness and intensity of sound.	**5**	**3**
19.	The average reverberation time of a Hall is 1.5 second and the area of the interior surface is 3340 m^2. If the volume of the hall is 1200 m^3, Find the absorption coefficient.	**5**	**3**
20.	Mention the properties of ultrasonics.	**5**	**2**

PART- B (5x 10=50Marks)

		Marks	CO	RBT LEVEL
21. (a)	What is stimulated emission? For atomic transitions, derive Einstein's relation and hence deduce the expressions for Einstein's coefficient.	**(10)**	**1**	**4**
(b)	Deduce an expression for the numerical aperture and acceptance angle of fiber in terms of the refractive index of the core and cladding.	**(10)**	**1**	**4**
22. (a)	Write the postulates of Planck's quantum theory of radiation. Derive Planck's radiation law.	**(10)**	**2**	**4**
(b)	Derive an expression for the change in wavelength of an X-ray photon when it collides with an electron.	**(10)**	**2**	**4**
23. (a)	Explain the No. of atoms, atomic radius, Co-ordination number and packing factor for SC and BCC structures.	**(10)**	**3**	**3**
(b)	Explain the HCP structure. Show that for an HCP structure c/a = $\sqrt{8}/\sqrt{3}$	**(10)**	**3**	**3**
24. (a)	What are metallic glasses? Discuss the properties and uses of it.	**(10)**	**4**	**3**
(b)	What is nano-phase materials? Describe the method of producing nano materials using chemical vapour deposition method.	**(10)**	**4**	**3**
25. (a)	Discuss the factors affecting the acoustics of building and their remedies.	**(10)**	**5**	**3**
(b)	Describe the production of ultrasonics using piezo electric method.	**(10)**	**5**	**3**

PART- C(1x 10=10Marks)
(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	With the help of an energy diagram, illustrate the construction and working of a four-level solid-state laser, where the Nd3+ ions act as the active centers.	**(10)**	**1**	**4**