Q. Code: 413214

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

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

First Semester

PH18151- ENGINEERING PHYSICS

(Common to all branches)

(Regulation 2018/2018A)

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

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Interpret the thermal properties of the materials.	**2**
CO 2	Exhibit the ability to solve the problems pertaining to the behavior of sub-atomic particles using quantum mechanics.	**2**
CO 3	Learn to solve the issues related to defects in the buildings due to acoustic design and the significance of ultrasonic waves.	**3**
CO 4	Develop an understanding about photonics and Fibre Optic communication system.	**3**
CO 5	Classify and demonstrate the fundamentals of crystals and their defects.	**2**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	In which process the heat transfer can take place without the medium? Justify your answer.	**1**	**2**
2.	Define the coefficient of thermal conductivity.	**1**	**2**
3.	Calculate the de-Broglie wavelength of an electron of energy 100 eV.	**2**	**2**
4.	Write the physical significance of the wave function.	**2**	**2**
5.	State relation between loudness and intensity.	**3**	**2**
6.	Which method is suitable for producing high frequency Ultrasonic waves?	**3**	**2**
7.	Differentiate spontaneous emission and stimulated emission.	**4**	**2**
8.	A fiber optic cable has an acceptance angle of 30° and a core index of refraction of 1.4. Calculate the refractive index of the cladding.	**4**	**3**
9.	Distinguish between crystalline and non-crystalline materials.	**5**	**2**

10.	For a cubic system, Sketch the planes with miller indices (100) and (111).	**5**	**2**	

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	How will you determine the thermal conductivity of a poor conductor using Lee's disc method? Give the necessary theory.	**(14)**	**1**	**2**
	(OR)			
(b)	Derive the expression for effective heat flow through compound media in series and parallel.	**(14)**	**1**	**2**
12. (a)	Derive an expression for the change in wavelength of an X-ray photon when it collides with an electron using Compton effect.	**(14)**	**2**	**2**
	(OR)			
(b)	Starting with the classical wave equation associated with moving particles, formulate the time-independent Schrodinger wave equation.	**(14)**	**2**	**2**
13. (a)	Explain the factors which affects the good speech intelligibility in a building and its remedies.	**(14)**	**3**	**3**
	(OR)			
(b)	Define Magnetostriction effect and explain how it can be applied for the production of ultrasonic waves using Magnetostriction oscillator.	**(14)**	**3**	**3**
14. (a)	With the help of an energy diagram, illustrate the construction and working of a four-level solid-state laser, where the Nd^{3+} ions act as the active centers.	**(14)**	**4**	**3**
	(OR)			
(b)	Define numerical aperture and acceptance angle of an optical fiber. Deduce an expression for the numerical aperture and acceptance angle of fiber in terms of the refractive index of the core and cladding.	**(14)**	**4**	**3**
15. (a)	Calculate the Atomic Packing Factor (APF) for SC, BCC and FCC structures.	**(14)**	**5**	**2**
	(OR)			
(b)	What is meant by crystal defects? Explain the various types of crystal	**(14)**	**5**	**2**

defects with a neat diagram.

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

			Marks	CO	RBT LEVEL
16.	**(i)**	Derive an expression for the inter-planar spacing for (h k l) planes of a cubic structure.	**(6)**	**5**	**2**
	(ii)	Calculate the interplanar spacing for the (101) plane in a simple cubic lattice whose lattice constant is 4.2 Å.	**(4)**	**5**	**2**

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