PH8151- Engineering Physics

UNIT-I PROPERTIES OF MATTER

1. Describe with necessary theory, the method to determine the Young's modulus of the material of a rectangular bar by uniform bending.

2. What is cantilever? Derive an expression for the depression at the free end of a cantilever when the other end is rigidly fixed.

3. Explain I shape girders.

4. Obtain the equation for couple per unit twist when a cylindrical rod is fixed at one end and twisted at the other end. Describe the principle and experiment of the torsional pendulum method for determining the rigidity modulus of the material of the wire.

5. Derive an expression for the amount of linear heat flow through a rod.

6. Write a short note on stress – strain diagram.

UNIT-II WAVES AND OPTICS

1. Derive an expression for differential equation for forced oscillations and obtain its solution. Discuss the different cases involved. Discuss the application of forced oscillation.

2. Derive an expression for differential equation for damped oscillations and obtain its solution. Discuss the different cases involved and their applications.

3. Explain the construction and working of a Homojunction and Heterojunction semiconductor semiconductor laser.

4. Discuss in detail the classification of optical fibers on the basis of material, mode and refractive index profile.

5. Explain the propagation of light through optical fiber. Explain the construction and working of displacement and temperature fiber optic sensors.

UNIT-III THERMAL PHYSICS

1. Describe Lee's disc method and Forbe's method of determining coefficient of thermal conductivity of a material.

2. Derive an expression for flow of heat through compound media i) series ii) parallel

3. Write a short note on (i) Expansion joints in buildings (ii) bimetallic strips in thermostats.

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UNIT - IV QUANTUM PHYSICS

1. Using quantum theory derive an expression for the average energy emitted by the black body and arrive at Planck's radiation law and hence deduce Wien's and Rayleigh Jeans laws.

2. Derive Schrödinger's time dependent and time independent wave equations.

3. Derive an expression for the energy levels of a particle inside a one dimensional infinitely deep potential well of width 'l'.

4. Discuss Compton Effect and derive the expression for Compton Shift.

5. With diagram explain the construction and working of a scanning tunneling microscope.

UNIT- V CRYSTAL PHYSICS.

1. Define the terms Atomic radius and packing factor. Calculate the above for SC, BCC and FCC structures.

2. Diamond crystal. Give details about its atomic radius, atomic packing factor and axial ratio.

3. Explain the principle and illustration of Bridgeman and Czochralski techniques for growing crystals

4. Determine the Coordination number, Atomic radius and Packing factor for Hexagonally Closely Packed (HCP) Structure (or) calculate the parameters of Hexagonally Closely Packed (HCP) Structure.

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