PH 8151 ENGINEERING PHYSICS

Important 13mark questions

Unit I

1. Derive an expression for the rigidity modulus using torsion pendulum.

2. Compare uniform and non-uniform bending.

3. Appraise the properties and applications of I shape griders.

4. Derive an expression for couple per unit twist for a cylinder.

5. Show that it is higher for a hollow cylinder made of the same material, mass and length.

6.What is torsion pendulum? Explain how it is used to determine the moment of inertia and rigidity modulus of the material of a thin wire?

7. Give the theory and experimental method of finding Young's modulus of a cantilever?

8. Describe Stokes' method of determining the coefficient of viscosity of a transparent, high viscous liquid?

9. Derive an expression for the deflection produced at the free end of a rectangular cantilever subjected to point load at free end. What will be the deflection produced at the free end, with same load if the cantilever is of circular cross section?

10. What is uniform bending? Derive an expression for the elevation at the centre of a bean which is loaded at both ends. Describe an experiment to determine young's modulus of a beam by uniform bending?

Unit -II

1. Define damped oscillation. Derive the differential equation of damped oscillation and give its general solution?

2. With suitable diagram explain the construction and working of homojunction Ga As laser?

3. How are fibres classified? Explain the classification in detail?

4. What are the different types of fibre optic sensors? Explain the working of any two sensors?

5. For atomic transitions, derive Einstein relations and hence deduce the expressions for the ratio of spontaneous emission rate and stimulated emission rate?

6.Derive the equation of motion. With appropriate figures.

7. Demonstrate the working of any one type of fiber optic pressure sensor.

8. Derive an expression for Acceptance angle and Numerical aperture of an optical fiber. Bring out the differences between step index and graded index fiber.

9. Derive Einstein's relations for spontaneous and stimulated emission of radiation.

10. Compare a homojunction semiconductor laser with a hetero junction semiconductor laser and detail their features.

Unit -III

1. Describe with theory Lee's disc method of determination of thermal conductivity of a bad conductor?

2. Derive an expression for the heat conduction through a compound made of two layers when bodies in series and parallel?

3. Write short note on expansion joints and bimetallic strips?

4. Drive an expression for the flow of heat through the compound media?

5. Explain the concept of thermal insulation. What is solar power? Describe the working of solar water heater?

6. With a neat sketch, explain the Forbe's method of thermal conductivity determination.

7. Compare the thermal expansion in solids and liquids.

8. How will you determine the thermal conductivity of a poor conductor using Lee's disc method. Give the necessary theory.

9. How are heat exchangers helpful in refrigerators of the surroundings is 320 C?

10. Relate the linear and volume thermal expansion coefficients for an isotropic solid.

Unit-IV

1. Solve Schrodinger wave equation for a particle in a one- dimensional box. Sketch the wave function and probability distribution function of the particle?

2. Explain with a neat diagram the working of scanning tunnelling microscope?

3. Obtain the eigen value and eigen function for an electron enclosed in a one-dimensional potential box?

4. Explain Planck's quantum hypothesis?

5. Calculate the minimum energy an electron can possess in an infinitely deep potential well of width 4 nm.

6. Derive the time-independent and time dependent Schrodinger wave equations.

7. Derive an expression for black body radiation using Planck's theory of radiation.

8. What is Compton effect? Give the theory of Compton effect and show that the Compton shift. $\lambda' - \lambda = h\, m0c\ (1 - cos\theta)$

9. Derive an equation for Plank's quantum theory of radiation.

10. What are the draw backs of classical free electron theory? Derive Schrodinger time dependent and time independent wave equations.

Unit-V

1. Explain Czochrolski method of growing crystal. Mentions the merits and demerits?

2. Explain any two crystal growing techniques?

3. Describe any one method of growing single crystal from melt along with advantages and limitations of the method?

4. Define the terms atomic radius packing factor. Calculate the above for SC, BCC and FCC structures?

5. What are miller indices? Explain how they are determined?

6. Derive the packing factor for HCP, SC, BCC, and FCC.

7. Describe the steps to determine Miller indices and also mention its importance.

8. Write a note on point imperfections in crystals. Discuss in detail a suitable method to grow single crystal of semiconducting materials.

9. Explain any one experimental method of growing single crystal.

10. Explain various crystal systems with neat diagrams