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**Question Paper Code : 25170**

B.E./B.Tech. DEGREE EXAMINATION, DECEMBER/JANUARY 2019.

First Semester

Civil Engineering

PH 8151 – ENGINEERING PHYSICS

(Common to All Branches)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is Hook's law?
2. Define tensile strength.
3. What is meant by cavity loss?
4. Why does inter modal dispersion occur?
5. Comment on the thermal behavior of Invar.
6. List the important characteristics of a material to be a thermal insulator.
7. Mention the physical significance of wave function.
8. Brief about the tunneling phenomenon.
9. Show the atomic positions in fcc and hcp crystal structures in a sketch.
10. What is Burger vector?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw the typical stress-strain diagram of a wire and mention its uses. (6)
- (ii) Derive an expression for the rigidity modulus using torsion pendulum. (10)

Or

- (b) (i) Compare uniform and non-uniform bending. (8)
- (ii) Appraise the properties and applications of I shape grids. (8)

12. (a) (i) Explain forced and damped oscillations.  
(ii) Derive the equation of motion. With appropriate figures. (8 + 8)

Or

- (b) (i) Give a schematic sketch of normal and population inversion state of a Laser and obtain Einstein coefficients A and B. (8)  
(ii) Demonstrate the working of any one type of fiber optic pressure sensor. (8)
13. (a) (i) Relate the linear and volume thermal expansion coefficients for an isotropic solid. (6)  
(ii) Compare the thermal expansion in solids and liquids. (10)

Or

- (b) (i) With a neat sketch, explain the Forbe's method of thermal conductivity determination. (8)  
(ii) Write a note on the following:  
(1) Heat exchangers (2) Solar water heaters. (8)
14. (a) (i) Derive the time-independent and time dependent Schrodinger wave equations. (12)  
(ii) A photon of frequency  $\nu_0$  scatters from an electron at rest and moves in a direction making an angle of  $60^\circ$  with the incident direction. If the frequency of the scattered photon is half that of incident photon, calculate the frequency of the incident photon. (4)

Or

- (b) (i) Demonstrate the working of scanning tunneling microscope. (6)  
(ii) Derive an expression for black body radiation using Planck's theory of radiation. (10)
15. (a) (i) Explain various crystal systems with neat diagrams. (8)  
(ii) Describe the steps to determine Miller indices and also mention its importance. (8)

Or

- (b) (i) Derive the Packing factor for HCP. (10)  
(ii) Explain any one experimental method of growing single crystal. (6)