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

Question Paper Code : 80277

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

First Semester

Civil Engineering

PH 8151 — ENGINEERING PHYSICS

(Common to all Branches)

(Regulation 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. List any two factors affecting elastic modulus and tensile strength.

2. An artificial denture with ultimate strength of 10^7 Nm^{-2} breaks when the jaws exerted a normal force of just 2N while eating. Estimate the area in which the force acted on the denture.

3. Show that it is possible for stimulated emission to be predominant over spontaneous emission at microwave frequencies (~GHz) at room temperature 300K.

   Given that $h = 6.626 \times 10^{-34}$ Js $k = 1.38 \times 10^{-23}$ J/K

4. List the two major differences of homojunction and heterojunction lasers.

5. What are bimetallic strips? Give its application.

6. Give any two examples in daily life demonstrating thermal insulation is done through compound media.

7. Give the two important characteristics of black body radiation.

8. Define Compton effect.

9. Determine the lattice constant of a FCC crystal having atomic radius of 14.76 nm.

10. How does plastic deformation occur in solids?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive an expression for couple per unit twist for a cylinder. (10)

(ii) Show that it is higher for a hollow cylinder than a solid cylinder made of the same material, mass and length. (6)

Or

(b) Derive an expression for rigidity modulus and explain how rigidity modulus of a wire can be determined using a torsion pendulum. (16)

12. (a) (i) Derive Einstein's relations for spontaneous and stimulated emission of radiation. (12)

(ii) Obtain the ratio of Stimulated emission rate to stimulated absorption rate and discuss population inversion. (4)

Or

(b) Derive Numerical Aperture and Acceptance Angle of a fiber. Discuss the various types of optical fiber. (8 + 8)

13. (a) Explain Forbe's method to determine the thermal conductivity of a good conductor. (16)

Or

(b) Explain Lee's Disc method to determine the thermal conductivity of a poor conductor. (16)

14. (a) Derive an equation for Plank's quantum theory of radiation. (16)

Or

(b) Solve time independent Schrödinger wave equation for a particle trapped in a potential well and obtain eigen functions and energy eigen values for the particle. Also show that the energy values are quantized. (16)

15. (a) Describe the two bulk crystal growth methods in detail using suitable schematic diagrams to fabricate semiconductor and dielectric materials. (16)

Or

(b) (i) Derive the packing factor for HCP crystal structure. (10)

(ii) Write short notes on crystal imperfections and its advantages. (6)

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