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

Question Paper Code : 80277

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

9-5-19
AN

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 × 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)

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

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 griders. (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 υ_0 scatters from an electron at rest and moves in a direction making an angle of 60° 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)

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

Question Paper Code : 90491

04/01/2020

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 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. State Hooke's law. What is Hooke's law limit ?
2. A copper sphere of radius 'r' is subjected to a pressure of 10^7 Pa. The copper has a bulk modulus of 130 GPa. Calculate the bulk strain.
3. What are the important characteristics of a laser source ?
4. Calculate the attenuation loss of optical power in dB in fibers when the input power is 2 mW and the output power is one mW.
5. If a steel bar of cross-sectional area 2 cm^2 has a coefficient of thermal expansion 12×10^{-6} mK^{-1} and Young's modulus 2.1×10^{11} Pa is heated by raising its temperature by 40°C with its ends fixed, how much will be the internal forces developed in the bar due to the increase in temperature ?
6. Why do people use hollow blocks of bricks for construction purposes ?
7. In a Compton experiment, the wavelength of the incident photon is 1 Å and that of the scattered photon is 1.02 Å. Calculate the kinetic energy of the recoiling electron.
8. Mention the significance of Schrödinger wave function Ψ.
9. Show that the packing factor for the Simple Cubic Structure is π/6.
10. What is coordination number ? Give the coordination number for Diamond structure.

PART – B (5×16=80 Marks)

11. a) Explain non-uniform bending method with suitable theory for determination of Young's modulus of a material of the beam. **(16)**

(OR)

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

12. a) i) For atomic transitions, derive Einstein's relations and deduce expressions for stimulated emission rate to the spontaneous emission rate of radiation. **(12)**

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

(OR)

b) Describe and discuss homojunction and heterojunction lasers. Explain why heterojunction lasers are preferred. **(14+2)**

13. a) i) Derive the general expression for the rectilinear flow of heat through a rod of uniform cross section. **(10)**

ii) Deduce expressions for the cases when the bar is of finite length and infinite length. **(4+2)**

(OR)

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

14. a) Explain Compton Effect and Compton wavelength. Derive an expression for Compton shift of wavelength. **(4+12)**

(OR)

b) Solve time independent Schrödinger wave equation for an electron 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 elaborately the seven crystal systems and 14 Bravais lattices with unit cell diagrams indicating atomic positions. **(16)**

(OR)

b) Show that the packing factor of FCC and HCP crystal structure are equal. **(6+10)**