Question Paper Code : 90491

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)