Question Paper Code : 54017

B.E./B.Tech. DEGREE EXAMINATION, JANUARY 2018
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 are the effects of hammering and annealing on elasticity of a material ?

2. When a wire is bent back and forth, it becomes hot. Why ?

3. Define forced and damped oscillations.

4. How will you classify optical fibers based on the material ?

5. Distinguish between conduction and convection.

6. For a free particle moving within a one dimensional potential box, the ground state energy cannot be zero, why ?

7. State Wien's displacement law.

8. What is a bimetallic strip ? Give its applications.

9. For a cubic system, sketch the planes with miller Indices (110), (101), (011).

10. Determine the lattice constant for FCC lead crystal of radius $1.746 \, \text{Å}$.

PART – B (5×16=80 Marks)

11. a) 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. (16)

(OR)

b) 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. (16)

12. a) Compare a homojunction semiconductor laser with a hetero junction semiconductor laser and detail their features. (16)

(OR)

b) Derive an expression for Acceptance angle and Numerical aperture of an optical fiber. Bring out the differences between step index and graded index fiber. (12+4)

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

ii) A metal cube takes 5 minutes to cool from 60°C to 52°C. How much time will it take to cool to 44°C, if the temperature of the surroundings is 32°C ? (12+4)

(OR)

b) How are heat exchangers helpful in refrigerators, ovens and solar water heater ? (16)

14. a) What is Compton effect ? Give the theory of Compton effect and show that the Compton shift. (16)

$$\lambda' - \lambda = \frac{h}{m_e c}(1 - \cos\theta)$$

(OR)

b) What are the draw backs of classical free electron theory ? Derive Schroedinger time dependent and time independent wave equations. (2+7+7)

15. a) What is packing factor ? Obtain packing factors for SC, BCC, FCC and HCP structures. (2+3+3+3+5)

(OR)

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