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

Question Paper Code : 53538

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

First Semester

Civil Engineering

PH 6151 — ENGINEERING PHYSICS — I

(Common to all branches)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a unit cell?

2. Lattice constant of a BCC crystal is 0.36 nm. Find its atomic radius.

3. How will you identify a brittle material from the stress-strain diagram?

4. Define thermal conductivity.

5. Define Wien's displacement law. Give its limitation.

6. What are the properties of matter waves?

7. State Weber-Fechner law.

8. Are ultrasonic waves electromagnetic waves in nature? Explain.

9. What is the purpose of using helium in CO_2 laser?

10. Draw the block diagram of a fibre optical communication system.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the construction and working of Bridgman techniques for growing crystals with its advantages. (12)

(ii) A crystal has primitives of 1 Å, 2 Å and 3 Å. A plane (321) cuts an intercept of 1 Å along the X-axis. Find the intercepts of the plane along the other two axes. (4)

Or

(b) Show that in ideal hexagonal closed packed structure c/a ratio is 1.663 and the density of atomic packing factor equals to that of the face-centered cubic structure. (6 + 4 + 6).

12. (a) (i) A cantilever is clamped horizontally at one end and loaded at the other. Obtain the relation between the depression at the loaded end and the load applied. (12)

(ii) Explain I-shaped girders. (4)

Or

(b) (i) Discuss the radial flow of heat and hence derive an expression for the quantity of heat conducted through any section in unit time. Describe the experiment to determine the thermal conductivity of Rubber. (12)

(ii) Two metal bars A and B are of 50 cm and 70 cm long respectively and have thermal conductivities 385 $Wm^{-1} k^{-1}$ and 296 $Wm^{-1} k^{-1}$ respectively. They are joined together by welding. The outer end of A is at 363 K and the cuter end of B is at 303 K. Calculate the temperature at the welded joint assuming that their cross sections are equal. (4)

13. (a) (i) Explain the radiation spectrum of a black body and derive Planck's radiation law. (12)

(ii) An X-ray photon of wavelength 0.010 nm is scattered through 110° by an electron. What is the kinetic energy of the recoiling electron? (4)

Or

(b) (i) Solve Schrodinger wave equation for a particle in a one dimensional box. Sketch the wave function and probability distribution function of the particle when it is in the ground state and first two excited states. (12)

(ii) Find the de Broglie wavelength of an electron accelerated through a potential difference of 80 kV. Find the wavelength of a X-ray photon that possess an energy same as that of the electron. (4)

14. (a) What are the factors affect the acoustics of a building? Explain each factor along with its remedy.

Or

(b) (i) What is acoustic grating? Describe the method of determining the velocity of ultrasonic waves using acoustic grating. (12)

(ii) Mention any four applications of ultrasonic waves. (4)

15. (a) (i) Describe the construction and working of CO_2 laser and their uses. (14)

(ii) For a semiconductor laser, the bandgap is 0.9 eV. What is the wavelength of light emitted from it? (2)

Or

(b) Explain the construction and working of displacement and Temperature fibre optic sensors. (8 + 8)