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Question Paper Code : 27470

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2015

Civil Engineering

First Semester

PH 6151 : ENGINEERING PHYSICS – I

(Common to all branches)

(Regulation : 2013)

Time : 3 Hours]

[Max. Marks : 100

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What is a Bravais lattice ? How many lattice types are possible in 3-dimensional space ?
2. How carbon atoms are arranged in diamond and graphite structures ?
3. An elastic wire is cut into half its original length. How will it affect the maximum load the wire can support ?
4. The ends of two rods A and B with thermal conductivities k_1 and k_2 respectively are maintained at temperatures θ_1 and θ_2 . The rods are of equal length. What is the condition under which there will be equal rate of flow of heat through both the rods ?
5. What will be the minimum energy of an electron in one-dimensional box of width 10 nm ?
6. Peak emission of radiation from sun is at a wavelength of 500 nm. Estimate the temperature of sun. (Wien's displacement constant = 2.898×10^{-3} m K)
7. A hall of volume 50000 m³ is designed to have a reverberation time of 1.4 s. What should be the total absorption in the hall ?
8. What is magnetostriction effect ? How it is used for production of ultrasound ?
9. Why Nd-YAG laser is more efficient than a Ruby laser ?
10. Give any four advantages of fibre optic communication system.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Describe the arrangement of atoms in a hexagonal close packed (hcp) structure. (4)
(ii) Determine the c/a ratio and packing factor for an ideal hcp structure. (12)

OR

- (b) (i) Describe Bridgman method of growing single crystals. What are the advantages and limitations of this method? (8)
(ii) Derive an expression for inter planar spacing 'd' between (hkl) planes of a cubic structure. (8)
12. (a) (i) Derive an expression for the depression produced at the free end of a cantilever due to the load. (12)
(ii) Give reasons why the cross-section of girders are I-shaped and made of steel. (4)

OR

- (b) (i) Describe Lee's disc method to determine the thermal conductivity of bad conductors. (1)
(ii) A copper rod of length 50 cm and cross-sectional area $6 \times 10^{-2} \text{ cm}^2$ is connected in series with an iron rod of same area of cross-section and length 25 cm. One end of copper is immersed in boiling water. The far end of the iron rod is in an ice bath of 0°C . Find the rate of transfer of heat from boiling water to ice bath. (Thermal conductivity of copper and iron are $401 \text{ Wm}^{-1} \text{ K}^{-1}$ and $80 \text{ Wm}^{-1} \text{ K}^{-1}$ respectively). (4)
13. (a) (i) What is Compton effect? Derive an expression for the wavelength of the scattered photon. (12)
(ii) What is the momentum and de Broglie wavelength of an electron accelerated through a potential difference of 56 V. (4)

OR

- (b) (i) Describe the construction and working of scanning electron microscope. (12)
(ii) Compare scanning electron microscope with transmission electron microscope. (4)
14. (a) Discuss the important factors that affect the acoustics of an auditorium and methods to maintain good acoustics. (16)

OR

- (b) Explain the working of ultrasonic flaw detector with a block diagram. Explain the different modes of scanning. (16)
15. (a) (i) Explain the principle of LASER. (4)
(ii) Describe the construction and explain the working principle of CO_2 laser with energy level diagram. (12)

OR

- (b) (i) Explain the principle of propagation of light through optical fibre. (4)
(ii) Derive an expression for acceptance angle and Numerical aperture. (12)