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Question Paper Code : X 61084

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2020
First Semester
Civil Engineering
PH 2111 – ENGINEERING PHYSICS – I
(Common to all Branches)
(Regulations 2008)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. What is magnetostriction effect ?
2. Write few properties of ultrasonic waves.
3. Calculate the wavelength of radiation emitted by an LED made up of a semiconducting material with band gap energy 2.8 eV.
4. What are the advantages of oxygen assisted laser cutting ?
5. For a step index optical fiber with a core of refractive index 1.48 and numerical aperture 0.649, calculate the refractive index of cladding.
6. What is the principle by which temperature is measured using a fiber optical sensor ?
7. Which law is most suited to explain the black body radiation ? Why ?
8. Why is SEM preferred in surface analysis than TEM ?
9. What are Miller indices ? Write the steps to find Miller indices.
10. Why is diamond insulator and graphite a conductor ?

PART – B

(5×16=80 Marks)

11. a) i) What is inverse piezo-electric effect ? Describe the method of producing ultrasonic waves by piezo-electric method. (10)
ii) Describe about any two methods using which ultrasonic waves can be detected. (6)

(OR)



- b) i) Give an account on the application of ultrasonics in
- 1) Drilling (3)
 - 2) Welding and (4)
 - 3) Cleaning. (3)
- ii) Explain the process of non destructive testing of materials using ultrasonic waves. (6)
12. a) i) Explain the process of spontaneous emission and stimulated emission. Derive Einstein's co-efficients and hence find the ratio between rate of spontaneous emission and stimulated emission. (12)
- ii) Find the ratio of rate of spontaneous emission to rate of stimulated emission for a sodium vapour lamp that emits light of wavelength 589.3 nm at 500 K. (4)
- (OR)
- b) i) With necessary theory explain the construction and working of CO₂ laser. Explain the role of He and N₂ in CO₂ laser. (12)
- ii) A laser diode is fabricated from a semiconducting material having a direct band gap of 2.25 eV. Find the colour of the light that will be emitted by the laser diode in operation. (4)
13. a) Explain in detail the classification of optical fibre. (16)
- (OR)
- b) Describe the principle of fibre optic sensors. Explain fibre optic displacement sensor and fibre optic temperature sensor. (16)
14. a) What is Compton shift ? Prove that the Compton Shift $\Delta\lambda = \frac{h}{M_0C}[1 - \cos\theta]$. Where the parameters have usual meaning. (16)
- (OR)
- b) Describe the construction of electron microscope and explain its operation. Write few advantages and disadvantages of electron microscope. (16)
15. a) Derive expressions for the packing factor of HCP and diamond structures. (16)
- (OR)
- b) Write an essay on crystal defects with special reference to the Burger vector. (16)
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