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Question Paper Code : 63229

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

First Semester

Civil Engineering

HS 1102 — 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. Mention the disadvantages of magnetostriction oscillator.
2. What are the properties of ultrasonic waves?
3. A He-Ne laser emits light at a wavelength of 632.8 nm and has an output power 1.75 mW. How many photons are emitted in each minute by this laser when operating?
4. Mention any four differences between holography and photography.
5. Optical power of 1.8 mW is launched into a 9 km optical fiber. The optical power emerging from the optical fiber is $9 \mu\text{W}$. Calculate the attenuation of the optical fiber.
6. What is intermodal dispersion?
7. Write the postulates of Planck's quantum theory.
8. What are matter waves?
9. The lattice constant of a cubic lattice is 'a'. Calculate spacing between (011), (101) and (112) planes.
10. Sketch the diamond crystal structure.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is inverse piezoelectric effect? (2)
(ii) Describe the production of ultrasonic waves can be produced by using piezoelectric method and mention its advantages. (14)

Or

- (b) What is NDT? Explain the NDT with block diagram and write its advantages and limitations.

12. (a) What is meant by stimulated and spontaneous emission? Derive Einstein's coefficients for stimulated and spontaneous emission.

Or

- (b) Explain the principle, construction and working of semiconductor laser with necessary diagram.

13. (a) (i) How are fibres classified? Explain the classifications in detail. (8)
(ii) Explain double crucible method of fibre manufacturing. (8)

Or

- (b) (i) Derive expressions for the numerical aperture and maximum acceptance angle of an optical fibre. (10)
(ii) Explain the construction and working of LED. (6)

14. (a) Explain Compton effect and its physical significance. Derive the relations giving the change of wavelength, the energy of recoil electron and the recoil angle. What is Compton shift?

Or

- (b) Write down Schrodinger equation for a particle in a box. Solve it to obtain eigen functions and show that the eigen values are discrete.

15. (a) (i) Derive the atomic packing and c/a ratio for a HCP system. (8)
(ii) Discuss in detail the ZnS and NaCl crystal structures with suitable examples. (8)

Or

- (b) (i) What are miller indices? With suitable illustration of different planes explain their significance in crystallography. (12)
(ii) Sketch the SC and BCC system and derive their atomic packing factor. (4)