Register Number: …….

B.E./B.TECH DEGREE EXAMINATIONS: JUNE 2010

First Semester

PHY 101 ENGINEERING PHYSICS

(Common to all Branches)

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PARTA (10 x 1 = 10 Marks)

1. The quality of tone

   A. decreases with loudness B. varies inversely as amplitude

   C. varies directly as pitch D. depends upon overtones present

2. State the correct answer

   A. Ultrasonics are sound waves of very long wavelength

   B. Ultrasonics are sound waves of very high frequency

   C. Ultrasonic waves move faster than sound waves

   D. Ultrasonics are electromagnetic waves.

3. Number of possible lattices in orthorhombic system

   A. 3 B. 2 C. 4 D. 1

4. The relation for atomic radius and cube edge in FCC unit cell is

   A. $r = a/3\sqrt{2}$ B. $r = a/2\sqrt{2}$ C. $r = \sqrt{2}a/2$ D. $r = \sqrt{2}/2a$

5. The condition for destructive interference in Michelson interferometer is that the path difference is equal to

   A. $n\lambda$ B. $(2n+1)\lambda/2$ C. $n\lambda/2$ D. $(2n+1)\lambda$

6. When an analyzer is inserted and rotated in the path of light, if intensity varies between maximum and zero, it is

   A. circularly polarized light B. elliptically polarized light

   C. plane polarized light D. partially polarized light

7. What happens when the light intensity incident on a photoelectric surface is doubled?

   A. the frequency of emitted photons is doubled.

   B. the number of photons is doubled.

   C. the number of photons becomes four times.

   D. there is no effect at all.

8. The equation of motion of matter wave was derived by

   A. Heisenberg B. Bohr C. de Broglie D. Schroedinger

9. The characteristic nature of a laser light is

A. multi wavelength B. moderate brightness

C. high degree of coherence D. more divergence

10. Acceptance angle of an optical fiber is

A. Sin $[\sqrt{(n_1^2 - n_2^2)}/n_o]$ B. $[\text{Sin } \sqrt{(n_1^2 - n_2^2)}] /n_o$

C. $[\text{Sin}^{-1} \sqrt{(n_1^2 - n_2^2)}] /n_o$ D. $\text{Sin}^{-1} [\sqrt{(n_1^2 - n_2^2)} /n_o]$

PART B (10 x 2 = 20 Marks)

11. What is decibel?
12. What is piezo-electric effect?
13. What are interfacial angles?
14. How do you calculate the co-ordination number of a HCP structure?
15. In an air wedge experiment, what will happen to the fringe width, if the air gap between the wedge forming plate is filled with water,?
16. What is birefringence?
17. What is Compton wavelength?
18. What are degenerate energy levels?
19. What is the need for population inversion and meta-stable state for the production of laser?
20. Distinguish between step index and graded index fibers.

PART C (5 x 14 = 70 Marks)

21. (a) Derive in detail Sabine's formula for reverberation time.

(OR)

(b) (i) Describe piezo-electric method for the production of ultrasonics. How are these used for sonar exploration? (8)

(ii) How the velocity of blood flow and movement of heart are measured using ultrasonics? (6)

22. (a) (i) Explain all the fundamental terms of crystallography. (8)

(ii) The lattice constant of a cubic lattice is 4.12 Å. Find the lattice spacing between (111), (112) and (123) lattice planes. (6)

(OR)

(b) (i) Draw the block diagram of ultrasonic flaw detector. Explain the 3 different scan displays used for data presentation. (8)

(ii) Explain the non destructive testing of materials by X-ray radiography methods. (6)

23. (a) (i) Explain the construction, types of fringes and applications of Michelson interferometer. (10)

(ii) A thin plate of refractive index 1.5 displaces 10 fringes when it is introduced in one of the arms of Michelson interferometer. Calculate the thickness of the plate if $\lambda = 600$ nm. (4)

(OR)

(b) (i) Write the theory of plane, circularly and elliptically polarized light. (8)

(ii) What is photo elasticity? What are the different parts and their functions of photo elastic bench? (6)

24. (a) (i) Discuss the experimental verification of compton shift effect expression. (6)

(ii) What is photoelectric effect? What are the essential physical assumptions needed to explain the characteristics of photoelectric effect? (8)

(OR)

(b) (i) Derive Schroedinger's time independent and time dependent equations for matter waves. (9)

(ii) Apply Schroedinger wave equation for electrons in a metal. (5)

25. (a) (i) Explain with theory, the working of Nd: YAG laser. List out five important applications of this laser. (8)

(ii) What is holography? Describe the construction and re-construction methods of a hologram. (6)

(OR)

(b) (i) Derive an expression for numerical aperture and angle of acceptance of a fiber system in terms of refractive indices of the core and cladding. (7)

(ii) Explain with schematic, the different parts of fiber optic medical endoscope and their functions. Name some of its applications. (7)

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