Register Number: …….

B.E / B.TECH DEGREE EXAMINATIONS: APRIL/MAY 2010

First Semester

U07PH101: PHYSICS - I

(Common to all branches of Engineering and Technology)

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

Answer All The Questions:-

PART A (10 x 1 = 10 Marks)

1. Sound absorption coefficient of a material is

   A) defined as the ratio of sound energy absorbed by the surface to the total sound energy incident on the surface

   B) directly proportional to the total sound energy incident on the surface

   C) inversely proportional to the sound energy absorbed by the surface

   D) defined as the ratio of total sound energy incident on the surface to the sound energy absorbed by the surface

2. There is an apparent change in the frequency of the sound waves emitted from the source, when there is a relative motion between the source and observer. This effect is known as

   A) Raman Effect B) Photo electric Effect C) Doppler Effect D) Compton Effect

3. The relation between the density of the crystal and the lattice constant is given by (n – Number of atoms per unit cell; N – Avogadro Number; A- atomic weight; a – lattice constant)

   A) $\rho = na / NA3$ B) $\rho = nA / Na3$ C) $\rho = na3 / NA$ D) $\rho = n\ Aa3 / N$

4. The thickness of the specimen which reduces the intensity of the X – Ray to half of its initial intensity value is called as

   A) Half wave plate. B) Quarter wave plate. C) Half value thickness D) Quarter Value thickness

5. The phenomenon of producing artificial double refraction is called as

   A) Partially polarized light B) induced birefringence C) Plane polarized light D) Birefringence

6. Photoelasticity deals with the analysis of stress distribution in structural and mechanical components with the help of

   A) UV Light B) Visible Light C) Polarized Light D) IR Light.

7. For various combinations of quantum numbers, if we get same eigen values and same eigen functions, then it is called as

   A) Hamiltonian operator. B) Energy operator. C) Degenerate state D) Non-Degenerate state.

8. As a result of Compton scattering, we get,

A) Unmodified radiation alone.

B) Modified radiation alone.

C) Both Unmodified and Modified radiation

D) Unmodified, Modified radiation and a recoil electron.

9. The process of raising the number of atoms to excited state by artificial means is called as

A) Stimulated emission B) Spontanious emission C) pumping D) optical resonator

10. The refractive index of the core is always _____ the refractive index of the cladding in any optical fiber.

A) equal to B) greater than C) smaller than D) smaller than or equal to

PART B (10 x 2 = 20 Marks)

11. What are the characteristics of Musical sound?
12. Mention the properties of Ultrasonic waves.
13. Copper has FCC structure and its lattice parameter is 3.6A0. Find its atomic radius.
14. Give any four techniques of testing a materials by NDT.
15. Explain the stress – optic law with a neat sketch.
16. Explain why colors are seen over a thin film of petrol on the roads.
17. Calculate the de-Broglie wavelength associated with aproton moving with a velocity equal to 1/20 th of the velocity of light.Given that the mass of the proton = 1.675*10-27 K
18. List out the Physical significance of a Wave function ψ.
19. Classify the types of lasers based on the active medium with one example for each.
20. Differentiate between a step index fiber and a graded index fiber.

PART C (5 x 14 = 70 Marks)

21. (a) (i) What is meant by Reverberation time. (2)

(ii) Derive an expression for Reverberation time of a hall. (Sabine's Formula) (12)

(OR)

(b) (i) What is meant by Piezo electric effect ? (2)

(ii) Explain how ultrasonic waves can be produced by using Piezo electric crystal with a neat diagram. (12)

22. (a) (i) What is meant by Atomic Packing Factor (APF)? (2)

(ii) Describe the structure of HCP crystal and obtain the relationship between "c" and "a" and hence calculate the APF. (12)

(OR)

(b) (i) What are the advantages of NDT. (2)

(ii) Describe the Liquid Penetrant method with a neat diagram. (12)

23. (a) (i) Distinguish between a polarized light and unpolarized light. (2)

(ii) Give the theory of plane, Circularly and Elliptically polarized light and also explain how a plane, circularly and elliptically polarized light can be produced. (12)

(OR)

(b) (i) What is meant by Photoelasticity ? (2)

. (ii) Explain the construction and working of a photoelastic bench with a neat diagram. (12)

24. (a) (i) What is meant by Compton effect ? (2)

(ii) Derive an expression for Compton shift and show that it is independent of the wavelength of the incident photons. (12)

(OR)

(b) (i) Explain the de-Broglie concept of matter waves. (2)

(ii) Derive Schroedinger's time dependent wave equation. (12)

25. (a) (i) Explain the modes of vibrations of Co2 molecule. (2)

(ii) Describe the construction and working of Co2 laser with a necessary diagram. (12)

(OR)

(b) (i) What is meant by acceptance angle ? (2)

(ii) Derive an expression for Numerical Aperture and angle of acceptance of a fiber in terms of refractive indices of the core, cladding and that of the surrounding medium. (12)

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