B.E/B.TECH. DEGREE EXAMINATIONS: NOV/DEC 2010

First Semester

PHY101: ENGINEERING PHYSICS

(Common to all Branches)

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

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. In acoustics for a change in intensity level of 1dB, the intensity changes to about

    A) 62%   B)16%   C) 26%   D) 66%

2. Which of the following material is most suitable for use in Piezo electric oscillater

    A) Nickel   B) $BaTiO_3$ C) Silicon   D) Gold

3. For a Hexagonal system , the lattice parameters are

    A) $a=b\neq c$, $\alpha=\beta=90^0 \& \gamma=120^0$ B) $a=b=c$, $\alpha=\beta=\gamma=90^0$

    C) $a\neq b\neq c$, $\alpha\neq\beta\neq\gamma\neq90^0$ D) $a=b=c$, $\alpha=\beta=\gamma=120^0$

4. The concept of differential absorption ($I=I_0 e^{-\mu t}$) is used in

    A) Ultrasonic flaw detector.   B) Liquid penetrant method.

    C) Thermography   D) X – ray radiography

5. When the movable mirror of a Michelson s interferometer is moved by 0.03 mm, a shift of
    100 Circular fringes is observed . The wavelength of the light used is

    A) $6328A^0$ B) $6000A^0$ C) $6800A^0$ D) $5800A^0$

6. If an unpolarized light is passed through a quarter wave plate , the emergent beam have a
    phase difference of

    A) $\pi/2$ B) $\pi/3$ C) π D)2π

7. Ejection of electrons from a metal surface when illuminated by light of suitable frequency is called

A) Compton effect   B) Planks effect   C) Stress-optic law   D) Photo lectric effect

8. The energy of an electron lying in the second energy level is

A) E_1 B) $2E_1$ C) $4E_1$ D) $6E_1$

9. The use of nitrogen in carbon-di-oxide Laser is to

A) Excite the carbon di oxide molecules   B) Stabilise carbon di oxide molecule

C) Scatter Carbon di oxide molecule   D) Remove heat

10. The light gathering capacity of an optical fibre is measured by

A) Total internal reflection.   B) Refractive index

C) Numerical aperture   D) Critical angle.

PART B (10 x 2=20 Marks)

11. Define absorption coefficient of a material.

12. What is an acoustic grating?

13. The unit cell of a crystal is body centered cubic with lattice constant 2.87A°, calculate its atomic radius.

14. What is the principle of thermography?

15. Give the uses of Michelsons interferometer.

16. State stress-optic law.

17. What are the postulates of Plancks quantum theory of black body radiation?

18. What is meant by degenerate and non-degenerate energy states?

19. What are the characteristics of Laser beam?

20. What is the principle of fibre-optic sensor?

PART C (5 x 14=70 Marks)

21. a) What is reverberation time and derive Sabines formula for the same

(OR)

b) (i) With a neat circuit diagram, describe the generation of ultrasonic waves by Piezo
electric oscillate. (10)

(ii) A quartz crystal of thickness 0.001 m vibrates in its fundamental frequency. Calculate
its frequency. Given, Youngs modulus for quartz = 7.9×10^{10} N/m^2, density of quartz =
2650 Kg /m^3 . (4)

22. a) (i) Derive the expression for interplanar distance in a cubic structure. (7)

(ii) Derive the atomic radius and packing factor for Bcc & Fcc structure. (7)

(OR)

b) (i) Explain the principle and various stages involved in the liquid penetrant method. (10)

(ii) Give the differences between X – ray radiography and fluoroscopy. (4)

23. a) (i) Discuss in detail, the theory of air wedge and derive an expression for fringe width.
How it is used for testing the optically plane surface. (10)

(ii) When thin film of glass is introduced in one of the arms of the Michelson
interferometer, it displaces 20 fringes. If the wavelength of light used is 5890A^0 and
the refractive index of the thin plate is 1.48.Calculate the thickness of the plate. (4)

(OR)

b) (i) Explain in detail, the production, behavior and analyses of plane, circularly and
elliptically polarized light. (10)

(ii) Write a note on photoelastic bench. (4)

24. a) What is Compton effect and derive an expression for the change in wavelength due to Compton scattering by incident light with matter.

(OR)

b) Arrive at the Schrödinger time independent wave equation and apply the same for a particle in a rectangular box to obtain the energy Eigen values and corresponding Eigen functions.

25. a) (i) Classify the types of fibre based on materials, refractive index profile and number of modes in detail. (9)

(ii) With a neat diagram, explain the operation of a fibre-optic communication system. (5)

(OR)

b) (i) Describe the construction, working of Co_2 Laser with energy level diagram. (9)

(ii) Explain the construction and reconstruction of Hologram. (5)

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