



**BE/B.TECH DEGREE EXAMINATIONS: JUNE 2015**

(Regulation 2013)

First semester

**U13PHT101: ENGINEERING PHYSICS**

(Common to all Branches)

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. ----- crystal structure is an example for Primitive cell
  - a) BCC
  - b) SC
  - c) FCC
  - d) HCP
2. Anisotropic structure have the ----- property
3. When a light wave is reflected at the surface of an optically denser medium, it suffers a phase change of
  - a)  $\pi$
  - b)  $\pi/2$
  - c)  $\pi/3$
  - d)  $\pi/4$
4. An active medium in semiconductor laser is -----
5. Schrodinger's time dependent equation in terms of Hamiltonian operator
  - a)  $H\psi = 2E\psi$
  - b)  $H\psi = E\psi$
  - c)  $H\psi = E\psi^2$
  - d)  $H\psi = E^2\psi$
6. The magnification in electron microscope is due to \_\_\_\_\_
7. The velocity of ultrasound in air
  - a) 1500 m/sec
  - b) 330 m/sec
  - c) 3300 m/sec
  - d) 150 m/sec
8. The equation used for the detection of depth (d) of sea in SONAR is \_\_\_\_\_
9. Fusion reaction is initiated with the help of
  - a) Low temperature
  - b) High temperature
  - c) Neutrons
  - d) Any particles
10. The properties of gamma ray are similar to \_\_\_\_\_ ray

**PART B (10 x 2 = 20 Marks)**

**(Not more than 40 words)**

11. What are unit cell and primitive cell?
12. Explain the coordination number for face centered crystal structure.
13. Mention the important properties of laser.
14. Calculate the acceptance angle and numerical aperture if the refractive indices of core and cladding of the fiber are 1.5 and 1.48.
15. What is meant by photoelectric effect?
16. What is meant by black body radiation?
17. What is meant by piezoelectric effect?
18. What is the concept behind the working of thermography?
19. Distinguish between atomic spectra and molecular spectra.
20. Give the applications of molecular spectra.

**PART C (5 x 14 = 70 Marks)**

**(Not more than 400 words)**

**Q.No. 21 is Compulsory**

21. (i) With neat sketch, discuss in detail the construction and working of a nuclear reactor and also give its advantages. (10)  
(ii) Show that for the fission of one  ${}_{92}\text{U}^{235}$  gives an energy of 200 MeV. (4)
  22. a) (i) With necessary diagrams mention coordination number. Derive the (c/a) ratio of Hexagonal close packed structure to find its packing factor. (10)  
(ii) Lattice constant of copper is 0.38 nm. Calculate the distance between the plane (110). (4)
- (OR)**
- b) (i) With necessary diagrams explain point defects, line defects, surface defects and volume defects in crystal systems. (10)  
(ii) Explain the effects of the crystal imperfections. (4)
23. a) (i) What is acceptance angle and formulate the expressions for acceptance angle and numerical aperture of an optical fiber (10)  
(ii) Classify the optical fibers based on materials, modes and refractive index profile. (4)

**(OR)**

- b) (i) Explain the different modes of vibrations of CO<sub>2</sub> molecule and discuss the construction and working of CO<sub>2</sub> laser with suitable energy level diagram. (10)
- (ii) Explain with block diagram, the fiber optic communication system (4)

24. a) State and prove Compton effect and also explain the experimental verification for the same.

**(OR)**

- b) (i) Derive Schrodinger's time independent wave equation for a moving particle. (7)
- (ii) Explain the construction and working of an electron microscope. (7)

25. a) (i) What is magnetostriction effect and explain the construction and working of magnetostriction method in generating ultrasonic wave. (10)
- (ii) A piezoelectric crystal has a length of  $4 \times 10^{-3} \text{ m}$  and density  $3 \times 10^3 \text{ kg/m}^3$ . Calculate its fundamental frequency. Given that Young's modulus of the material is  $8.2 \times 10^{10} \text{ N/m}^2$ . (4)

**(OR)**

- b) (i) Explain Liquid Penetrant method for Non destructive testing of materials. (7)
- (ii) Explain X- ray radiography technique for the analysis of a specimen. (7)

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