Registration No. | | | | | | | | | |

B.E./B.Tech. Degree Examinations, December 2016

First Semester

PH16151 – ENGINEERING PHYSICS – I

(Common to all branches)

(Regulation 2016)

QP Code:128356

Time: Three hours **Maximum : 100 marks**

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

1. Name the seven crystal systems.
2. Why diamond is called a loosely packed system?
3. Calculate the Poisson's ratio for the material, given Y = 12.25 × 10^{10} N/m^2 and n = 4.55 × 10^{10} N/m^2.
4. How much heat will be conducted through a slab of area 90×10^{-4} m^2 and thickness 1.2×10^{-3} m in one second when its opposite faces are maintained at difference in temperature of 20 K, the coefficient of thermal conductivity of that material is 0.04 $Wm^{-1}K^{-1}$.
5. Give the physical significance of wave function.
6. An electron and a photon have got the same KE. Which of the two has greater de-Broglie wavelength?
7. Show that a 26% change in intensity alters the sound intensity level by 1 decibel.
8. Can we use copper rod in magnetostriction generator? Why?
9. What are the characteristics of laser?
10. Calculate the numerical aperture of an optical fibre whose core and cladding are made of materials of refractive indices 1.6 and 1.5 respectively.

PART B - (5 X16 = 80 Marks)

11. (a) Explain HCP structure. Show that for an HCP structure $\frac{c}{a}=\sqrt{\frac{8}{3}}$ and hence calculate Packing Fraction for HCP structure. **(16)**

(OR)

(b) (i) Show that for a cubic lattice the distance between two successive plane (h k l) is given by $d=\frac{a}{\sqrt{h^2+k^2+l^2}}$ **(8)**

(ii) Describe Bridgmann method of crystal growth. Mention its advantages and disadvantages. **(8)**

12. (a) Derive an expression for the elevation at the centre of a beam which is loaded at both ends. Describe the experiment to determine Young's Modulus of the beam using uniform bending method. **(16)**

(OR)

(b) (i) Describe the theory of radial flow of heat and explain the experiment of determining coefficient of thermal conductivity of a thick rubber pipe through which steam is flowing. **(12)**

(ii) Steam at 100°C is passed through a rubber tube 15cm of length which is immersed in a copper calorimeter of negligible thermal capacity containing 400 gm of water. The rate of rise of temperature per second is 0.02°C when it is at room temperature 19.99°C. The external and internal diameters of the tube are 1cm and 0.75 cm respectively. Calculate the thermal conductivity of rubber. **(4)**

13. (a) What is Compton Effect? Give the theory of Compton effect and show that the Compton shift $\Delta\lambda=\frac{h}{m_o c}(1-\cos\theta)$ **(16)**

(OR)

(b) (i) Derive an expression for Schrodinger's Time dependent wave equation. **(6)**

(ii) Show that the energy of a micro particle confined in an infinite one dimensional potential well of length "L" is given by $E_n = \frac{n^2\ h^2}{8\ m\ L^2}$ where the symbols have their usual meaning. In the above situation the particle cannot have zero energy. Explain, Why? **(10)**

14. (a) Derive an expression for growth and decay of energy density inside a hall and hence deduce Sabine's formula for the reverberation time of a hall. **(16)**

(OR)

(b) (i) Draw a block diagram of ultrasonic flaw detector. Describe the working of ultrasonic flaw detector for NDT by reflection mode. **(12)**

(ii) Describe the principle and working of sonogram with block diagram. **(4)**

15. (a) (i) Derive an expression for Einstein's coefficient of spontaneous and stimulated emissions. **(8)**

(ii) Describe the construction and working of Nd-YAG laser with energy level diagram and write its applications. **(8)**

(OR)

(b) (i) Explain the propagation of light through optical fibre and obtain an expression for numerical aperture and acceptance angle. **(8)**

(ii) Explain fibre optical communication system with neat block diagram. **(8)**