12/12/19/FN

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 92073

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

First Semester

Civil Engineering

PH 6151 – ENGINEERING PHYSICS – I

(Common to All Branches)

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Plank constant = 6.62×10^{-34} J s

Speed of light = 3×10^{8} m s^{-1}

Electron position mass = 9.11×10^{-31} kg

Proton position mass = 1.67×10^{-27} kg

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Calculate the d-spacing of (321) planes of a simple cubic cell of lattice constant 0.41 nm.

2. What is the coordination number of diamond unit cell ?

3. A copper wire of 3m length and 1 mm diameter is subjected to a tension of 5N. Calculate the elongation produced in the wire if the Young's modulus of copper is 120 GPa.

4. State Newton's law of cooling.

5. An electron is confined to a one-dimensional box. How does the energy level spacing changes when the box is made longer ?

6. Give any four differences between scanning electron microscope and transmission electron microscope.

7. State Weber-Fechner Law.

8. List any four factors affecting the acoustics of buildings.

9. What is an optical fiber ?

10. State the use of Nd-YAG laser.

PART – B **(5×16=80 Marks)**

11. a) i) What is packing factor ? Prove that the packing factor of HCP is 0.74. **(2+10)**

ii) Copper has FCC structure and its atomic radius is 1.273 Å. Find

1) Lattice parameter and **(2)**

2) Density of copper. **(2)**

Given

Atomic weight of copper = 63.5

Avagadro's number = 6.026×10^{26} mol^{-1}.

(OR)

b) i) Describe Bridgmann method of crystal growth. **(8)**

ii) Briefly explain the Chemical Vapour Deposition (CVD) method. **(8)**

12. a) i) Derive an expression for internal bending moment of a beam. **(8)**

ii) Derive an expression for the elevation produced at the centre of a simply supported beam loaded at both the ends. **(8)**

(OR)

b) i) Describe Lee's disc method to determine the thermal conductivity of bad conductors. **(12)**

ii) A wall consists of layer of wood and a layer of cork insulation of same thickness. The temperature inside is 20°C and the temperature outside is 0°C. Calculate the temperature at the interface between wood and cork, (Thermal conductivity of wood and cork are 0.13 W/m-K and 0.046 W/m-K respectively). **(4)**

13. a) i) What are matter waves ? Describe the properties of matter waves. Explain in detail G.P. Thomson's gold foil experiment that proved the existence of matter waves. **(6+6)**

ii) Calculate the de-Broglie wavelength of a proton and an electron, accelerated by a potential of 150 V. **(4)**

(OR)

b) i) Derive an expression for the energy of a particle in a 1D box. Also arrive at an expression for its normalized wave function. **(8)**

ii) A particle of mass one microgram takes 100 S to travel from end to the other end of an one dimensional box of width 1 mm. Assume that the potential inside and at the walls of the box to be zero and infinity respectively. Determine the quantum number described by this motion. **(8)**

14. a) i) Describe in detail the production of ultrasonic waves by magnetostriction method. **(10)**

ii) Describe the method of determining the velocity of ultrasonic waves using acoustic grating. **(6)**

(OR)

b) Derive Sabine's formula for the reverberation time of an auditorium and explain how it can be used to determine the absorption coefficient of a material. **(16)**

15. a) Explain how laser action is achieved in homojunction and heterojunction Ga-As laser with suitable diagrams. **(16)**

(OR)

b) Write short notes on :

i) Endoscope. **(8)**

ii) Fibre optic - displacement sensor. **(8)**