A

Reg. No. :

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. In _____ atoms and molecules are arranged in a regular fashion.   CO1- R

    (a)Amorphous solids   (b) Crystals   (c) Glasses   (d) Plastics

2. _____ crystal system has maximum number of Bravai's lattices.   CO1- R

    (a) Cubic   (b) monoclinic   (c) triclinic   (d) Orthorhombic

3. Intensity of a sound wave is 0.4 W m^{-2}, its sound intensity level is   CO2-R
    _____ decibel.

    (a) 0   (b) 110   (c) 116   (d) 118

4. Choose the appropriate material for magnetostriction oscillator.   CO2 -R

    (a) Iron   (b) Glass   (c) copper   (d) Quartz crystal

5.   _____ confirms the transverse nature of light.   CO3- R

    (a) Interference   (b) Polarization   (c) Compton effect   (d) Diffraction

6. _____ is pumping technique used in solid lasers.   CO3- R

    (a) Electric discharge   (b) Direct conversion   (c) Optical pumping   (d) Heating

7. Compton effect can be explained by _____   CO4- R

    (a) Quantum theory   (b) Classical theory   (c) Classical mechanics   (d) Diffraction

8. Wave length associated with an electron at rest is _____   CO4 -R

   (a) 0 A°   (b) 10 A°   (c) 100 A°   (d) Infinity

9. _____ law states that "within the elastic limit stress is directly   CO5- R
   proportional to strain".

   (a) Elastic law   (b) Hooke's law   (c) Weber-Fechner law   (d) Ohm's law

10. Lee's disc method is used to calculate thermal conductivity   CO5 -R
    of_____ material.

    (a) Insulating   (b) Conducting   (c) Semiconducting   (d) Nano

<center>PART – B (5 x 2= 10Marks)</center>

11. Distinguish between crystals and amorphous solids.   CO1- R

12. Intensity of the sound waves produced during thunder is 0.1 W m^{-2}. Calculate   CO2- R
    sound intensity level.

13. List any four industrial applications of laser.   CO3 -R

14. X rays having wavelength 10 A° is scattered by carbon atoms with scattering   CO4 -R
    angle 45°. Calculate the change in wave length of scattered X ray photons.

15. State Hooke's law.   CO5- R

<center>PART – C (5 x 16= 80Marks)</center>

16. (a) Prove that the packing factor for face centered cubic structure and   CO1 -App   (16)
        hexagonally close packed structure are same.
<center>Or</center>
    (b) Explain the Bridgeman method to grow single crystals.   CO1- U   (16)

17. (a) Construct an oscillator circuit using quartz crystal to generate   CO2 -App   (16)
        sound waves having frequency more than 20000 Hz.
<center>Or</center>
    (b) Describe an experimental setup to determine the velocity of   CO2- U   (16)
        ultrasonic waves in given liquid also derive the expression for
        velocity of ultrasonic waves in liquid.

18. (a) Discuss the theory of plane, circular and elliptically polarized   CO3 -Ana   (16)
        light.
<center>Or</center>

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(b) Discuss the probability of atomic transitions in the following process.   CO3- Ana   (16)
1. Stimulated absorption (or) Induced absorption.
2. Spontaneous emission.
3. Stimulated emission (or) Induced emission.
Also deduce Einstein's coefficients.

19. (a) Derive Schrödinger's time independent and dependent wave equations.   CO4 -U   (16)

Or

(b) What is Compton effect? Explain the Compton effect based on quantum theory and also derive the expression for Compton effect.   CO4 -U   (16)

20. (a) Derive an expression for depression produced at the loaded end of the cantilever. Based on that how will you determine the Young's modulus of the given brass beam.   CO5 -U   (16)

Or

(b) Define thermal conductivity. How will you determine the thermal conductivity of a given card board by Lee's disc method.   CO5 -U   (16)

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