

SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E/ B. Tech – Common to ALL Branches

Title of the paper: Applied Physics - I

Semester: I

Max. Marks: 80

Sub.Code: ET103/3ET103/4ET103/5ET103

Time: 3 Hours

Date: 13-05-2008

Session: AN

PART – A

(10 x 2 = 20)

Answer All the Questions

1. Two identical vessels of different materials are filled with the quantity of ice. In one of them ice melts in 40 minutes and in other in 70 minutes. Calculate the ratio of the thermal conductivities of the materials?
2. The surface of a furnace is at 1700°C . Assuming that it is a black body, how much heat is radiated by 1.0m^2 of this surface in one hour? (Stefan's constant = $5.4 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$)
3. Name the phenomena which produces the colours in soap bubble.
4. Calculate the specific rotation if the plane of polarization is turned through 26.4°C , traversing 20 cm length of 20% sugar solution.
5. A loudspeaker emits energy in all direction at the rate of 1.5 J/s. what is the intensity level at a distance of 20 m? Standard intensity level of sound = $10^{-12} \text{ W/m}^{-2}$.
6. What is SONAR? Briefly explain how are ultrasonic waves used in SONAR.

7. Determine the Change of percentage of the earth's mass when it's radius is reduced by 1%.
8. Name the type of strain when a spiral spring is stretched by a weight attached to it.
9. Calculate the first permitted energy level of an electron in a box of 1×10^{-10} m wide.
10. Why diffraction of X-rays is not possible with ordinary grating?

PART – B

(5 x 12 = 60)

Answer All the Questions

11. Explain thermal conductivity. Describe Lee's disc method for determining thermal conductivity of a poor conductor?(2+10)
(or)
12. (a) A flat vertical wall 6 m^2 in area maintained at a constant temperature of 116°C and the surrounding air on both sides is at 36°C . How much heat is lost from the wall in one hour by natural convection. The weak ΔT - dependence of h for vertical plate is given by $4.24 \times 10^{-4} (\Delta T)^{1/4} \text{ k.cal.s.}^\circ\text{C}$ (3)
(b) Describe the construction and working of Disappearing Filament Pyrometer. (9)
13. Give an account of the wave theory of light and explain the approximate rectilinear propagation of light on this theory.
(or)
14. What is meant by circularly and elliptically polarized light? Briefly describe how these can be produced and detected.(3+9)
15. Define reverberation time. Derive Sabine's mathematical relation for reverberation time (2+10)
(or)

16. What is meant by magnetostriction effect? Explain how are the ultrasonic waves produced using a magnetostriction oscillator. (2+10)
17. Derive expression for gravitational potential and gravitational field at a point i) Inside ii) Outside and iii) on the surface of a spherical shell. (or)
18. Describe Torsion Pendulum. How it can be used to measure the moment of inertia of an irregular body and torsional rigidity? (2+10)
19. What are matter waves? Explain Davisson and Germer experimental method used to explain the explain of matter waves. (or)
20. What is Compton Effect? Deduce a mathematical expression for Compton shift produced in a scattering. (2+10)