Second Unit Test in PHYSICS

Std. 12   Time : 1½hr.
07-12-2015   M. Marks: 35

1.   Monochromatic light of wave length 589nm is incident from air on a water surface.
        What are the wave length and frequency of refracted light. Refractive index of water is 4/3.
        C= 3×10^8m/s   (1)

2.   The refractive index of the material of an equilateral prism is $\sqrt{3}$. What is the angle of
        minimum deviation?   (1)

3.   A tube light can be operated only at 110V. The available a c voltage is 220V. Suggest a
        suitable method to operate the tube light. Why a resistor cannot be used for the same
        purpose?   (2)

4.   A circuit element 'X' is connected across A.C. source. A current of $\sqrt{2}$ flows through it and
        this current is in phase with voltage. Another element of 'Y' is connected across the same
        source and found that same current is flowing but current is leading the voltage by π/2
        radians.
        (i)   Name the elements 'X' and 'Y'
        (ii)   Find the current flowing through the circuit if the elements are connected
                 in series and combination is connected across the same source.   (2)

5.   Write the expression for inductive reactance, capacitive reactance and impedance of
        LCR series circuit. Show the variation of them graphically with the angular frequency.   (2)

6.   Derive a relation for average power dissipation over a cycle in an A.C. circuit.   (2)

7.   Use the mirror equation to deduce that an object placed between F and C of a concave
        mirror produces a real image beyond 'C'   (2)

8.   The intensity at the central maxima in a Young's double slit experiment is I_o

        If the distance of a point on the screen from the center is $\frac{1}{3}$ of the fringe width, show that

        intensity at that point is equal to $\frac{I_o}{4}$.   (2)

9.   A light is incident at the polarizing angle on a glass plate. The angle of refraction is 37°.
        (i)   What is the angle of polarization?
        (ii)   What is the refractive index of glass?   (2)

10.   A capacitor is charged by a source of emf. The capacitor is disconnected from the source
        and then connected across the terminals of an ideal inductor. Explain what happens to
        the charge on the capacitor and current through the inductor?   (2)

11.   A plane wave front is incident obliquely on air water interface. Explain the formation of
        corresponding refracted wave front and hence prove Snell's law.   (3)

12.   What do you mean by diffraction? Draw a neat diagram to show the diffraction by a
        single slit and derive the condition for observing secondary maxima and minima.
        Why intensities of secondary maximas are not equal and decrease abruptly?   (3)

13. Draw a neat ray diagram of a compound microscope. How this microscope is adjusted to obtain the final image at least distance of distinct vision? Write the formula for magnifying power. (3)

14. A screen is placed 90cm from an object. The image of the object on the screen is formed by a convex lens at different locations separated by 20cm. Determine the focal length of the lens. (3)

15. A thin convex lens made up of material of refractive index n_2 is placed in a medium of refractive index n_1 ($n_1 < n_2$) A point object is placed in front of the lens. Draw a neat ray diagram showing the refraction on each surface. Using this ray diagram derive the lens maker's formula and hence deduce a relation for power of biconcave lens. (1+3+1)

-x-x-x-x-x-x-