1. Why does a metallic piece become very hot when it is surrounded by a coil carrying high frequency alternating current? [1]

2. How would the angular separation of interference fringes in young's double slit experiment change when the distance of separation between the slits and the screen is doubled? [1]

3. Give expression for the average value of the a c voltage $V = V_0 \sin \omega t$ over the time interval $t = 0$ and $t = \pi / \omega$. [1]

4. The following data was recorded for values of object distance and the corresponding values of image distance in the experiment on study of real image formation by a convex lens of power +5D. One of these observations is incorrect.
    Identify this observation and give reason for your choice: [1]

S.No.	1	2	3	4	5	6
Object distance ( )	25	30	35	45	50	55
Image distance	97	61	37	35	32	30

5. An equiconvex lens with radii of curvature of magnitude R each, is put over a liquid layer poured on top of a plane mirror. A small needle, with its tip on the principal axis of the lens, is moved along the axis until its inverted real image coincides with the needle itself. The distance of the needle from the lens is measured to be 'a'. On removing the liquid layer and repeating the experiment the distance is found to be 'b'.
    Given that two values of distances measured represent the focal length values in the two cases, obtain a formula for the refractive index of the liquid. [3]


a.
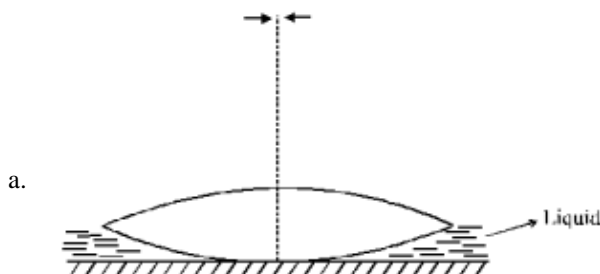
6. A convex lens made up of glass of refractive index 1.5 is dipped, in a medium A of refractive index 1.65. medium B of refractive index 1.33. Explain, giving reasons, whether it will behave as a converging lens or diverging lens in each of these two media. [3]

7. What is diffraction of light? Draw a graph showing the variation of intensity with angle in a single diffraction experiment. Write one feature which distinguishes the observed pattern from the double slit interference pattern. [3]

8. How would the diffraction pattern of a single slit be affected when:
    a. the width of the slit is decreased?
    b. the monochromatic source of light is replaced bya source of white light? [3]

9. What is induced emf? Write Faraday's law of law of electromagnetic induction. Express it Mathematically.
   A conducting rod of length 'l' with one end pivoted, is rotated with a uniform angular speed 'ω' in a vertical plane, normal to a uniform magnetic field 'B'. Deduce an for the emf induced in this rod. [3]

10. A spherical surface of radius of curvature R, separates a rarer and a denser medium as shown in the Figure. Complete the path of incident ray of light, showing the formation of a real image. Hence derive the relation connecting object distance 'u', image 'v', radius of curvature R and the refractive indices n_1 and n_2 of the two media. [3]
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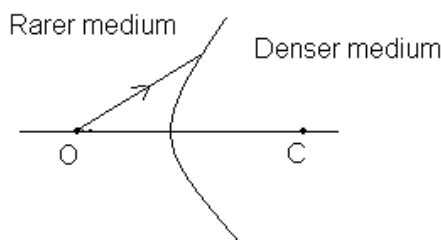
11. The given circuit diagram shows a series LCR circuit connected to a variable frequency230V source:

   (a)Determine the source of frequency which derives the circuit in resonance.
   (b)Calculate the impedance of the circuit and the amplitude of current at the resonant Frequency
   (c) Determine the rms potential drops across the three element of the circuit.
   (d) How do you explain the observation that algebraic sum of the voltages across the three elements obtained in is greater than the supplied voltage? [5]