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Assignment – (PHY-102) B. Tech. Semester - I
(Section- E)

1. What do you understand by principle of superposition of waves? What are the ways to get coherent sources?
2. Comments on 'two independent sources cannot be coherent'.
3. A plano-convex lens is placed on the glass plate as shown in Fig. 1.
   (a) Draw the ray diagram of coherent waves.
   (b) If plano-convex lens is raised by height 'h', then calculate what would be the maximum height for getting the Newton's ring pattern?

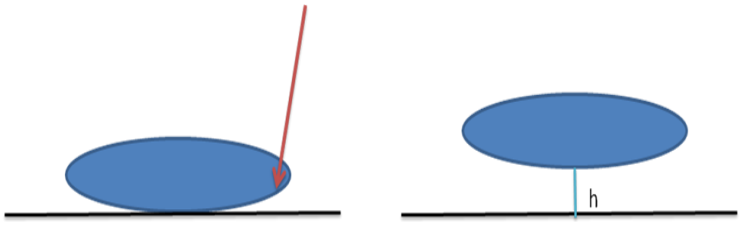

Fig. 1 Plano-convex lens placed over glass plate

4. Since sodium light source is not purely monochromatic. Calculate the numbers up to which Newton's ring pattern overlapped?

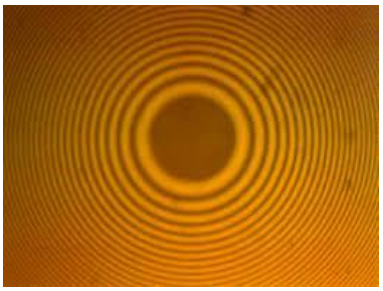

Fig. 2 Newton's Ring pattern

5. In single slit diffraction pattern the distance between the first minima on either side of the central zero maximum is 4.4 mm as observed on a screen at a distance of 0.7 m. The wavelength of light used is 5890 Å. Calculate the slit width.
6. In a Newton's ring's experiment, the diameter of the 15^{th} ring was found to be 0.59 cm and that of the 5^{th} ring was 0.336 cm. If the plano convex lens is 100 cm, calculate

the wavelength of light used. What happens to ring diameter if air film is replaced with liquid of refractive index 1.5?

7. The current gain in CB mode of a NPN transistor is 0.98 and the collector base leakage current I_{CBO} is 12 μA. Calculate: (1) The collector current I_C (2) The base current I_B for the emitter current I_E =2mA.

8. In the common base mode a transistor, the emitter current is 1 mA. When the emitter circuit is open, the collector current is 50μA. If $\alpha = 0.92$, calculate the total collector current.

9. 1.0 ampere current flows in a silver strip of length 5mm and width 0.1mm, along its length. The strip is placed in a magnetic field of strength 1.0 tesla along its width. Calculate the Hall voltage developed across the width of the strip. (Atomic weight of Silver = 108 and density = 10.5×10^3 Kg/m^3)

10. What is the probability of an electron being thermally promoted to the conduction band in (a) Germanium (Eg = 0.7 eV), (b0 silicon (eg = 1.1 eV) and (c0 perovskite materials (Eg = 1.3 eV)