You have been provided with a convex lens, two pins fixed on to a stand and a screen.

(a) **You have been asked to determine the position of the real image of one pin formed through the convex lens with the other pin. Draw the experimental setup that you would arrange with the given equipment to conduct this experiment. Mark the object pin as *O*, the image pin as *I* and the screen as *S*. Moreover, mark the positions of foci of the lens.**

(b) **Write the important steps that you would follow when determining the position of the image in part (a) above with the parallax method.**

(c) **When a certain concave lens was kept in contact with the convex lens, no real image was obtained for any position of the object pin.**

(i) **What could be the possible reason behind this?**

(ii) **Draw a ray diagram to demonstrate an instance like this.**

(d) **When a suitable concave mirror was kept behind the compound lens stated in part (c) above, a real image was obtained at the position of the object pin.**

(i) At which position should the center of curvature of the mirror should be located in order to obtain an image as such?

(ii) In this setup, the distance to the object pin and to the concave mirror from the compound lens were 20 cm and 10 cm respectively. If the radius of curvature of the concave mirror is 20 cm, calculate the focal length of the compound lens.

(iii) If the focal length of the convex lens is 20 cm, what is the focal length of the concave lens?
