Hello students, this module is for Bachelor of Science third year Electronics and 2nd year physics students. The paper code is ELD105 for electronics and PYC 104 for physics. The paper title is photonics for electronics and Optics Section one for physics.Title of the unit is interference. Module name Fresnel’s Biprism and Lloyd's Mirror. The module number is 9 for Electronics, 2 for physics. Outline: Fresnel's Biprism, use of fresnel’s biprism to obtain coherent sources of light. Lloyds Mirror. Learning outcomes: at the end of the module learner will be able to explain interference by fresnel’s Biprism and Lloyds Mirror.

Interference due to fresnel's biprism. Here we'll discuss the construction. Fresnel's Biprism consists of two prisms of very small reflecting angles joined base to base. In practice, a thin glass plate is taken and one of its faces is ground and polished till a prism is formed. It has an obtuse angle of 179 degrees and two side angles of the order of 30 minutes. Working : The biprism is placed with its refracting edge parallel to the length of the slit S. When light from the source S falls on the lower portion of the prism as shown in the diagram, after refraction appears to come from the virtual image S2. Similarly, light from the source S falling on the upper portion, after refraction appears to come from the image S1. This has been shown clearly in the diagram. Hence, S1 and S2 act as two coherent sources. These light waves are in a position to interfere in the region beyond the biprism. Interference fringes of equal width are observed on the screen. conditions for bright and dark Bands: Let S1 and S2 be two virtual images of the source S. Let small ‘d’ be the distance between S1 and S2 as shown in the figure. The fringes are formed on a screen T kept at a distance capital D from the Biprism. The point O on the screen is equidistant from S1 and S2. Hence the waves arrive from S1 and S2 at O simultaneously and the point O is always bright. On both sides of O, alternate bright and dark fringes are produced. If P is an arbitrary point on screen and if X is the distance of P from O, then it can be shown from the path difference which is equal to S2P minus S1P is equal to X small d by Lambda. Now P is bright if this path difference S2P minus S1P which is equal to X small d by Lambda should be equal to M Lambda. P is dark if this path difference S2P minus S1P should be equal to XD by Lambda which is equal to two M + 1 Lambda by two. Here M is an integer. Thus on screen, alternate bright and dark bands are formed.

Determination of wavelength of light using fresnel's biprism: Experimentally unknown wavelength of any given monochromatic source of light can be determined by mounting fresnel's biprism on an optical bench. A monochromatic source of light, such as sodium vapour lamp, illuminates a narrow vertical slit. The Biprism is placed in such a way that it's refracting edge is parallel to the length of the slit. In order to observe fringes a micrometer eyepiece is used. This diagram shows the clear setting. The wavelength can be calculated using formula. Lambda is equal to beta d by capital D. Where beta is the fringe width that is, the distance between two consecutive bright points or two consecutive dark points. Small d is the distance between two coherent sources, which can be determined experimentally. Capital D is the distance between the eyepiece and the slit. Lloyds mirror. Construction : Lloyd's mirror MN consists of a plane mirror which is polished on the front surface and blackened at back to avoid multiple reflections. Working: light from a narrow slit S1 illuminated by monochromatic light is partially incident at a grazing angle on the surface of this mirror. This gives rise to S2. S2 is a virtual image of the slit S1. Another portion of the light proceeds directly from the Slit S1 to the screen. The Slits S1 and S2 act as two coherent sources, the interference between direct and reflected light occurs within region of overlapping of the two beams and fringes are produced at a distance Capital D from S1 in the shadow portion AE. The Point C lying on the right bisector of S1S2 gives the position of the central fringe of zero path difference. It is expected to be bright. However, it is not visible as no reflected light reaches C. Arrangement of apparatus to determine unknown wavelength of monochromatic source of light is as shown in the figure. Here S1 is a narrow slit S2 as explained is the virtual image of S1. Thus S1 and S2 act as two coherent sources The wavelength can be calculated using the formula Lambda is equal to beta small d by capital D. Where small d is the distance between S1 and S2. Which can be determined. Beta is the fringe width that is the distance between consecutive bright or consecutive dark bands. Capital D is the distance between the screen and the sources.

conclusion: Fresnel's Biprism and Lloyd's mirror can be used to obtain two coherent sources of light, which produces a good interference pattern Unknown wavelength of any monochromatic source can be experimentally determined using fresnel’s, Biprism or Lloyd's mirror.

These are the references. Physics for degrees students by S. Chand and Company by Aurora C.L, doctor Hemne P.S. second book a textbook of engineering students by Doctor Avadhanalu M.N.and Doctor Kshirsagar P.G. The third book is a textbook of optics by Doctor Avadhanalu M.N. and Lal Bridge Dr Subramaniam by S.Chand . Thank you.