Unique Paper Code	: 32225310
Name of the Paper	: Waves and Optics
Name of Course	: B.Sc. HonsCBCS_GE
Semester	: III - Semester
Duration	: 3 Hours
Maximum Marks	: 75

Attempt any four questions in all. All questions carry equal marks.

- Q1. (a) A particle is subjected simultaneously to two simple harmonic motions of the same period but of different amplitudes and phases in perpendicular directions. Derive the expression for the resultant motion. For what conditions the path may be a straight line, ellipse or circle? Discuss the different important cases. (12)
 - (b) A particle is subjected to two perpendicular simple harmonic motions simultaneously.

 $x = A_1 Cos (2\omega t + \alpha)$ $y = A_2 Cos(\omega t)$

Obtain lissajous figures analytically and graphically if $\alpha = \pi/2$ and π (6.75)

Q2. (a) Discuss the phenomenon of interference due to parallel thin films and find the conditions of maxima and minima. (10.75)

(b)Show that the conditions of Maxima and minima in reflected and transmitted monochromatic light are complementary. (4)

(c) Show that a film of infinitesimally small thickness appears dark in reflected light. (4)

Q3.(a) In Fresnel Diffraction, show that the intensity due to entire wavefront is give	en by $R_1 ^{2}/4$
where R_1 is the amplitude for first Fresnel half period zone.	(10)
(b) Discuss the theory of zone plate and show that it acts as convex lens.	(8.75)

Q4 (a) Giving the necessary theory, discuss the formation of Newton's rings by reflected light and explain how it can be used for determination of wavelength of monochromatic source of light. Why Newton's rings are circular? (14) (b) In a Newton's ring experiment, the diameter of the 15th ring was found to be 0.590 cm and that of the 5th ring was 0.336 cm. If the radius of the plano-convex lens is 100 cm, calculate the wavelength of light used. (4.75)

Q5. (a) Distinguish between Fresnel and Fraunhofer class of diffraction. (3)

(b) Derive an expression for intensity distribution for Fraunhofer diffraction due a single slit. What happens when the width of the slit is gradually increased? (15.75)

Q6. (a). Explain briefly, the different ways of producing plane polarized light? What is Nicol prism and how is it used to produce polarized light? (12.75)

(b)What are sound waves? How can they be produced? Write four properties of sound waves. (6)