B.Sc. 4th Semester (Major)
PAPER: 402 (THEORY)

(a) WAVE OPTICS **Total Marks:40**

1. Interference

1.	(a)	What is interference of light?	2
	(b)	Discuss the phenomenon of interference with relation to law of conservation of energy.	3
	(c)	When a thin sheet of transparent material of thickness 7×10^{-6} m is introduced in a path of one of the interfering beams, the central fringe shifts to a position occupied by the sixth bright fringe. If $\lambda = 6\times10^{-7}$m, Find the refractive index of the sheet.	3
	(d)	Why do we see colors when white light falls on a thin film of transparent medium?	1
	(e)	In Newton's ring experiment the diameter of 23 rd ring was found to be 0.501 cm and that of 3rd ring was 0.181cm. If the radius of curvature of the plano convex lens is 0.5m, calculate the wavelength of light used.	3
	(f)	In Michelson's Interferometer 100 fringes cross the field of view when the movable mirror is displaced through 0.02948 mm. Calculate the wavelength of monochromatic light used.	3

2. Diffraction

2	(a)	Distinguish between the Fresnel and Fraunhofer type of diffraction	2
	(b)	Discuss the phenomenon of diffraction at a straight edge.	4
		or	
		What is zone plate? Derive an expression for its focal length.	
	(c)	Discuss the Fraunhofer diffraction due to a single slit.	4
	(d)	A parallel beam of sodium light is allowed to be incident normally on a plane grating having 4250 lines per centimeter and a second order spectral line is observed to be deviated through 30°. Calculate the wave length of the line.	3

3. Polarization

3.	(a)	What is unpolarized and polarized light?	2
	(b)	What is Polarizer and Analyzer ?	2
	(c)	State the laws of Malus.	1
	(d)	Explain polarization by Double refraction.	2
	(e)	i. What is plane, circular and elliptically polarized light? ii. What is Half wave plate and Quarter wave plate?	3+2=5
		or	
		i. What is specific rotation of plane of polarization? ii. Describe half-shade polarimeter.	1+4=5