

No.	Title		
1.	Subject	Waves and Optics	
2.	Subject Code	KE005	
3.	Status	Major	
4.	Credit Hours	Four (4) [(3L + 1T) x 14 weeks + 12 hours Lab]	
5.	Semester and Year	Semester 3	
6.	Pre-requisite	-	
7.	Mode of Delivery	Lectures, tutorials and laboratories	
8.	Assessment	Assignments	5%
		Lab work/Test	20%
		Class Test	15%
		Final Examination	60%
9.	Objectives	To give an overall view of electromagnetic waves and about light and its properties.	
10.	Learning Outcomes	<p>Upon the completion of the unit, the student will be able to:</p> <ol style="list-style-type: none"> 1. Distinguish the mechanical & stationary waves and their associated properties. 2. Develop the understanding of the basic properties of light and interpret them in terms of waves. 3. Understand and solve problems on the photon concept for the interaction of light energy and matter. 4. Develop practical/laboratory skills, including the collection, display and analysis of data. 	
11.	Details of subject	Contents	Hours
		Chapter1: Mechanical waves Introduction to light & wave. Different types of waves: mechanical waves, transverse wave, longitudinal wave. Wavelength, amplitude, period & frequency.	3L 1T
		Chapter 2: Wave equation Sinusoidal progressive waves. Wave equation, phase, Superposition. Interference. Standing waves. Interference. Reflection. Refraction. Diffraction.	6L 2T
		Chapter 3: Electromagnetic waves Spectrum of electromagnetic waves. Generation and properties of electromagnetic wave.	3L 1T
		Chapter 4: Polarization Polarization and light waves. Plane polarized light. Brewster's law.	3L 1T
		Chapter 5: Light Reflection. Law of reflection. Image produced by reflection. Image produce by spherical mirrors. Mirror formula. Refraction. Laws of refraction. Refractive index. Critical angle. Thin lens. Lens equation. Image produced by refraction of thin lens.	12L 4T

		Chapter 6: Wave interpretations Huygen's construction. Wave fronts. Interference, Young's double slit experiment. Fringes separation. Air wedge. Newton's rings. Coating. Diffraction of light waves. Diffraction & grating.	6L 2T
		Chapter 7: Light and matter Photo-electric effect. Photon. Threshold frequency. Quanta. Einstein's Theory of photoelectric effect. Wave-particle duality. Energy levels in atoms. Spectral lines. Energy bands in solids. Band spectra.	6L 2T
		Chapter 8: LASER Simple qualitative model of a LASER. Characteristic of LASER light.	3L 1T
		Total	L = 42 hrs T = 14 hrs P = 12 hrs 68 hours
12.	Main Reference	1. Muncaster, R. (1995). <i>A-Level Physics</i> (4 th ed.). Stanley Thornes Publishers Ltd. 2. Duncan, T. (2005). <i>Advanced Physics, Volume 2</i> (5 th ed.). John Murray Publication.	
13.	Additional Reference		
14.	Practical/Lab Classes	The practical class consists of 6 experiments of 2 hours each. 1. Measuring of angle of incidence and angle of reflection 2. The position in a plane mirror 3. Centre, radius of curvature and focal length of a Circular Mirror 4. Refraction: a) To verify Snell's Law. b) To calculate the critical angle 5. Lens: Measurement of focal length and finding the location of image positions 6. Measurement of wavelength of light.	