Objectives Electromagnetic Waves

Topic	Objectives
Electromagnetic waves	name some particular electromagnetic waves and order them by their wavelength (24.2) sketch standing electromagnetic waves on $\lambda/2$ and $\lambda/4$ antennas Sketch running electromagnetic wave (with correct orientation) (24.1) realise that the speed of light in vacuum is the same for all electromagnetic waves (24.3) calculate the speed of electromagnetic waves in other media (26.1) calculate the Poynting vector and explain its meaning (24.4) Explain what the radiation characteristic of an antenna is
Polarisation (24.6)	explain the difference between polarised and unpolarised waves (with examples) know different ways to polarise light (filter, reflection) calculate field and intensity of an electromagnetic wave after it has travelled through a polarisation filter describe application for polarisation (e.g. LCD, sunglasses)
Doppler effect (24.5)	realise qualitative difference between acoustic and optical Doppler effect (absolute vs. relative speeds) calculate wavelength and frequency shift
Huygens' principle (27.5)	describe the concept of a wavelet is representation of waves with wave fronts and rays (25.1) explain Huygens' principle in your own words and apply it to simple examples (e.g. reflexion and refraction)
Ray optics (physics labs)	reflexion (25.2) and refraction (26.2) total internal reflexion (26.3) dispersion (26.5) lenses (26.6 – 26.9)
Interference and diffraction	understand interference and diffraction as a wave phenomenon impossible to describe with light rays realise relation between optical path length difference and intensity in a double slit (27.2) know qualitative differences between interference patterns of double slit and grating (27.7) simple calculations with double slit and grating (27.2, 27.7) know conditions for diffraction to occur describe two applications of diffraction (e.g. spectral analysis, X-ray diffraction)

Constant	Value
Speed of light in vacuum (air)	$c = 3 \cdot 10^8$ m/s
Visible light	400 nm (violet) – 800 nm (red)
Wavelength of HeNe laser light	632.8 nm (red)