7. Waves

7.4 Electromagnetic spectrum

Paper 2

Question Paper

1 Light of a single frequency is incident normally on a diffraction grating. An interference pattern of bright and dark fringes forms on the semicircular screen shown in Fig. 6.1.

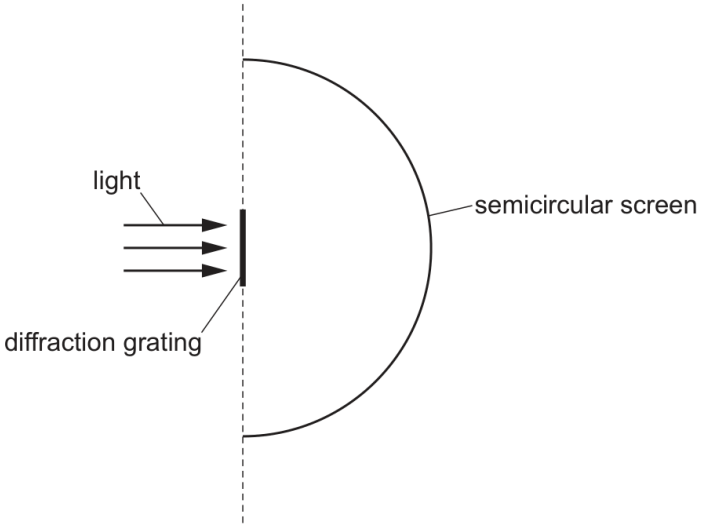


Fig. 6.1 (not to scale)

The light has wavelength 520 nm.
The separation of the lines in the grating is 3.8×10^{-6} m.

(b) The light is replaced with red light of a single frequency.

(i) State whether the frequency of the red light is greater than, less than or the same as the frequency of the original light.

..... [1]

2 **(a)** An electromagnetic wave in a vacuum has a wavelength of 8.4×10^{-6} m.

(i) State the name of the principal region of the electromagnetic spectrum for the wave.

..... [1]

3 **(c)** Electromagnetic waves of wavelength 0.040 m are emitted in phase from two sources X and Y and travel in a vacuum. The arrangement of the sources is shown in Fig. 4.1.

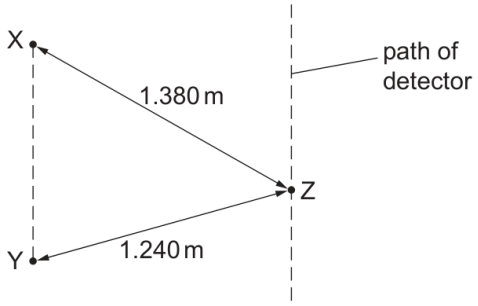


Fig. 4.1 (not to scale)

A detector moves along a path that is parallel to the line XY. A pattern of intensity maxima and minima is detected.

Distance XZ is 1.380 m and distance YZ is 1.240 m.

(i) State the name of the region of the electromagnetic spectrum that contains the waves from X and Y.

..... [1]