5 (a) Explain what is meant by *coherent* light waves.

....

.... [1]

(b) Coherent light of wavelength 550 nm is incident normally on a double slit of slit separation 2.1 mm, as shown in Fig. 5.1. Both slits in the double slit arrangement have a width of 0.1 mm. A series of bright and dark fringes forms on a screen placed a distance of 2.4 m from the double slit. The screen is parallel to the double slit.
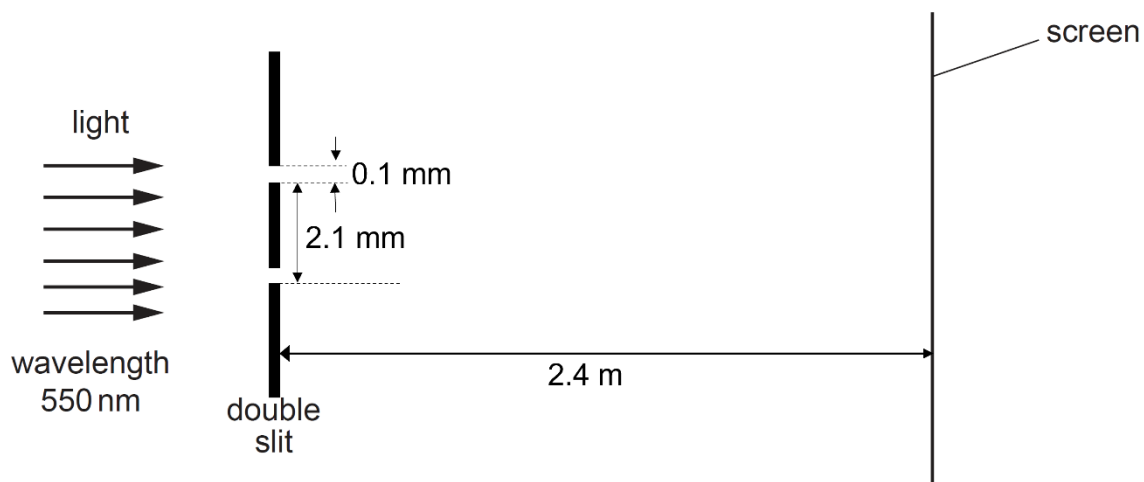

Fig. 5.1 (not to scale)

(i) Initially, one of the two slits is covered.

Calculate the width of the central fringe of the single-slit diffraction pattern seen on the screen.

Give your answer to three significant figures.

fringe width = ………………………… m [3]

[Turn over

(ii) Both slits are now uncovered.

Estimate, to one significant figure, the number of fringes resulting from double-slit interference that are seen within the central maximum produced by single-slit diffraction.

number = …………………………………   [3]

(iii) The light of wavelength 550 nm is replaced with monochromatic red light.

State and explain the change, if any, in the distance between the centres of adjacent double slit bright fringes.

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………………………………………………………………………………………………

……………………………………………………………………………………………... [1]

[Total: 8]