2. Determine how far below the balloon would the slotted mass be after 3.0 s. You may assume that the slotted mass has not yet landed on the ground and that air resistance on the slotted mass is negligible.

distance = ... m [3]

3. Describe qualitatively the changes, if any, to the answer in **(b)(ii)2** if a 100 kg cargo was dropped from the balloon instead of the slotted mass. Assume air resistance on the cargo is negligible too.

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.....[1]

[Total: 8]

2 **(a)** State the conditions required for a body to be in equilibrium.

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.....[2]

(b) Fig. 2.1 shows a lamp weighing 5.0 N that is hung from the end of a beam 4.50 m long and weighing 1.0 N, making an angle of 25° below the horizontal.

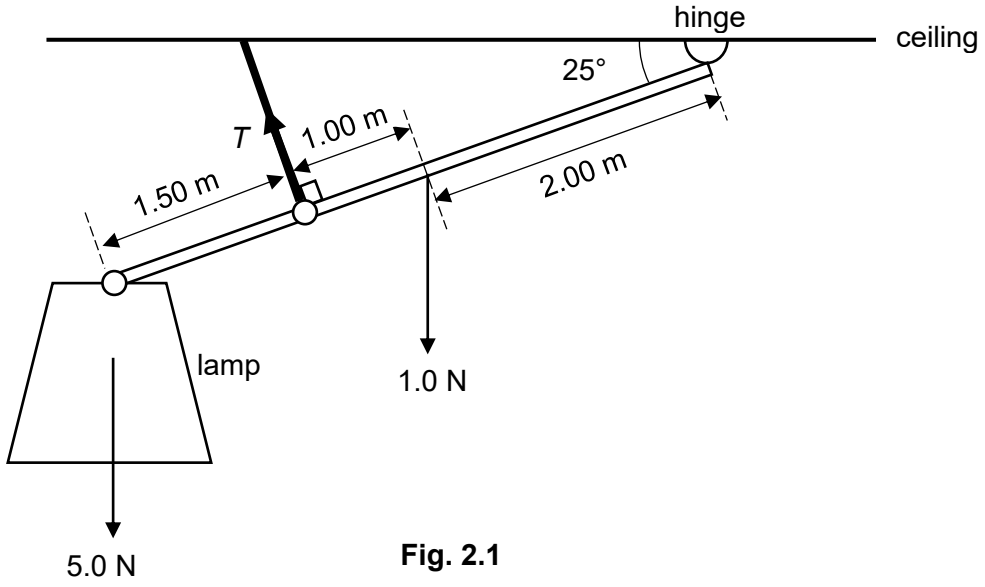

Fig. 2.1

The beam is held in position by a hinge at its upper end and by a cable 3.00 m lower down the beam and perpendicular to it. The centre of gravity of the beam is 2.00 m along the beam from the hinge.

(i) The position of the centre of gravity of the beam is not at its midpoint. Suggest what this implies about the distribution of the mass in the beam.

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..... [1]

(ii) Show that the tension T in the cable is 7.4 N.

[2]

(iii) Determine the magnitude and the direction of the force acting on the beam at the hinge.

ontal

magnitude = ... N

direction = ...