1 **(a)** State the conditions for an object to be in *equilibrium*.

1: .....

.....

.....

2: .....

..... [2]

(b) A non-uniform bar is suspended at rest in a horizontal position by two cords of negligible mass which make angles of 36.9° and 53.1° with the vertical as shown in Fig. 1.1.

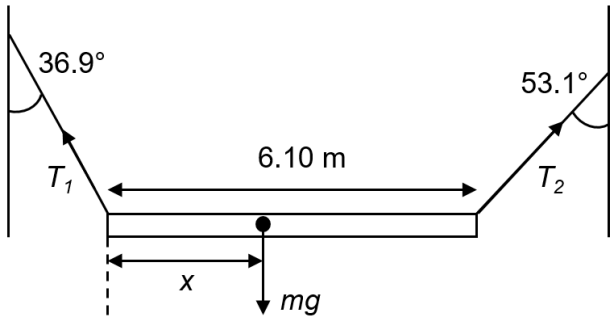

Fig. 1.1

For a bar of length 6.10 m,

(i) Show that $T_1 = 1.33\ T_2$

[1]

(ii) Hence or otherwise, determine the distance x between the left end of the bar and its centre of gravity.

x = ... m [3]

(iii) Determine the maximum mass of the bar m that can be suspended if the maximum tension that each cord can handle without breaking is 20 N.

m = ... kg [2]

(iv) State and explain if there is any difference to your answer to **(b)(iii)** if the mass of the cords is not negligible.

.....

.....

..... [2]

[Total: 10]