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

1. .....

.....

2. .....

.....

[2]

(b) Fig. 2.1 shows a uniform beam AB of length 6.0 m and weight 2700 N suspended by two ropes AC and BC, each of length 6.0 m. The tensions in ropes AC and BC are T_1 and T_2 respectively.

A worker of weight 900 N is holding onto the beam at point D, where AD = 4.0 m and DB = 2.0 m.

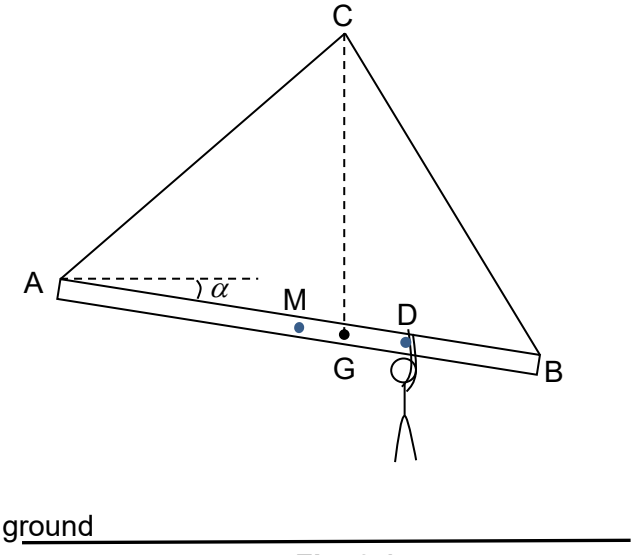

Fig. 2.1

The beam makes an angle α to the horizontal. The point M is the mid-point of the beam and the point G on the beam is the position of the centre of gravity of the beam and the worker.

(i) Explain in terms of forces acting on the beam, why the point G must lie directly below C.

.....

.....

.....

.....

.....[2]

(ii) Calculate the distances MG and DG.

distance MG = ... m

distance DG = ... m
[2]

(iii) If the angle α is 2.8°, determine the magnitude of the tension T_2.

tension T_2 = ... N [2]

[Total: 8]