4 **(a)** Define the *torque* of a couple.

.....

.....[2]

(b) A wheel is supported by a pin P at its centre of gravity, as shown in Fig. 4.1.

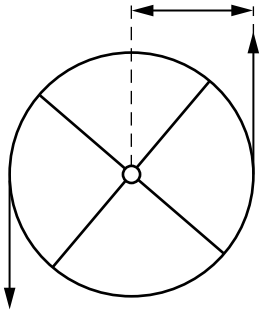

Fig. 4.1

The plane of the wheel is vertical. The wheel has radius 25 cm.
Two parallel forces each of 35 N act on the edge of the wheel in the vertical directions shown in Fig. 4.1. Friction between the pin and the wheel is negligible.

(i) List two other forces that act on the wheel. State the direction of these forces and where they act.

1. .....

2. .....
[2]

(ii) Calculate the torque of the couple acting on the wheel.

torque = ... N m [2]

(iii) The resultant force on the wheel is zero. Explain, by reference to the four forces acting on the wheel, how it is possible that the resultant force is zero.

.....

.....[1]

(iv) State and explain whether the wheel is in equilibrium.

.....[1]