

## Engineering Studies

### Section III (continued)

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Marks

**Question 18 — Engineering and the Engineering Report (10 marks)**

- (a) Discuss the use of CAD systems as an alternative to traditional drawing methods.

3

CAD is an extremely important concept in engineering. It allows drawings to be done with 100% accuracy, produces a much neater finish, can be easily dimensioned, and allows many different views of the one drawing in numerous settings. Most importantly, however, it allows the manipulation, or alteration of a design without completely starting the design over.

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## Question 18 (continued)

(b)



- (i) In many public areas, polymer containers similar to those shown are provided for rubbish and recyclable materials. Describe a forming process to produce the main body of these large containers. 2

Blow Impact extrusion may be used to produce such a hollow object. This is done at elevated temp to reduce stresses on the component. If it is stressed it will be more likely to fail.

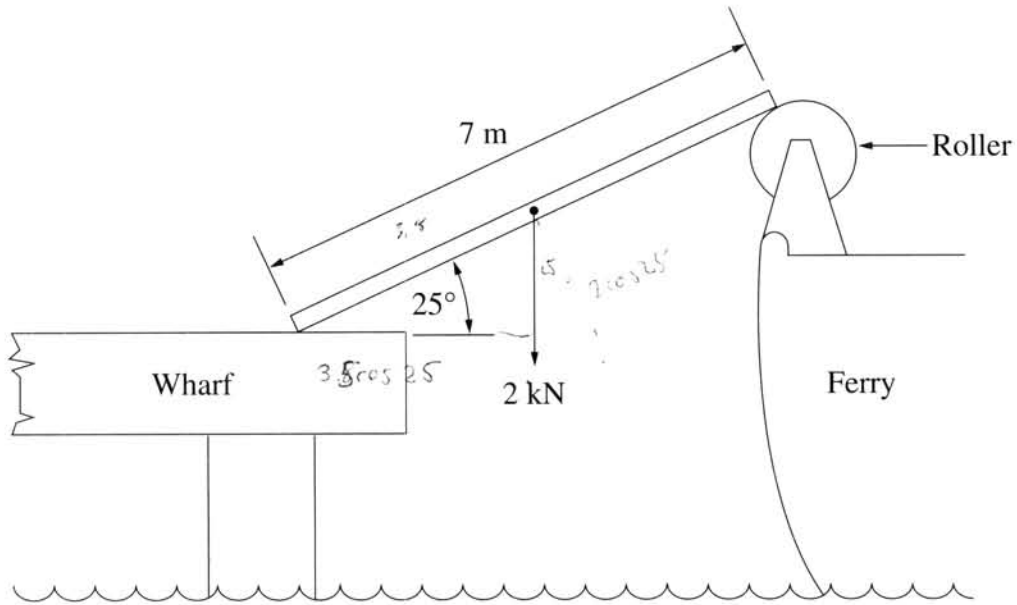
- (ii) The lids used for the containers are moulded from polyethylene. Outline the reasons for this being a suitable choice of material in service. 2

This material is strong, flexible and does not corrode. When subjected to forces such as ~~throwing~~ such properties are necessary to ensure a long life time of the bin.

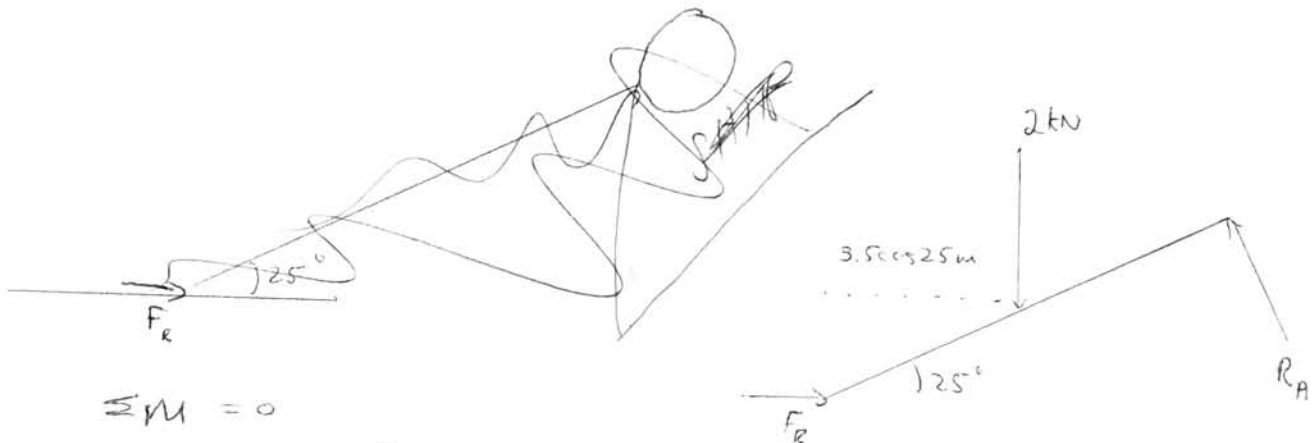
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Question 18 (continued)

- (c) A loading ramp between a ferry and a wharf is shown. The ramp has a weight of 2 kN and a coefficient of static friction with the wharf of 0.2. There is no friction at the roller support. 3



Sketch a free-body diagram of the ramp. Show whether the ramp will slip or remain static for these conditions.



$$\sum \mu = 0$$

$$\therefore Fd \downarrow = Fd \uparrow$$

$$3.5 \cos 25 + 2000 = R_A \times 7$$

$$R_A = 906.3 \text{ N}$$

$\therefore$  The system is in equilibrium and it will not slide.

$$\therefore F = \mu N$$

$$= 0.2 \times 906.3$$

$$= 181.26$$

$$= 2 \cos 25$$

$$= \text{Weight component}$$

End of paper