

ANSWERS

1 (b) $\chi = 0.5$, $W^* = 0$, $Q^* = 0.5$, $F^* = 1$

(c) (i) $\chi \approx 0.6$, (ii) temperature increase reduced to about 31%.

2 $h_{\min} \approx 2\pi^2 S^2 c$

3 (c) Spin most likely at steel/steel contacts where potential friction torque is lower than at larger Al/steel contacts.

Required torque 2.23×10^{-5} Nm

4 (c) Appropriate standard module 4.5 mm; reasonable design might have face width of 67 mm through hardened gears, pinion with 15 teeth wheel with 45.

(d) Possibilities include – helical teeth, increase tooth numbers, better material etc.