ENGINEERING TRIPOS PART IA

Wednesday 2 June 2010 9 to 12

Paper 1

MECHANICAL ENGINEERING

Answers

1. (a) 2/3 h; (b) 5 m below hinge O; (c) 5.89 m.
2. (a) -27.5 kPa; (b) 84.07 kPa.
3. (a) 2.12%; (b) 29.3; (c) 12.88 kW.
4. (a) 0.355 kg; (b) 596 K, 20 kJ, 86.7 kJ.
5. (a) - (b) - (c) 822 kN; (d) 76.05 kPa; (e) 29.97 MW.
6. (a) - (b) - (c) 18.02 kg, 628.7 K, 124.7 kg; (d) 21.44 MJ.
7. (a) - (b) 37/48 ml^2; (c) 3/8 l.
8. (a) - (b) - (c) $g/2$.
9. (a) $\sqrt{\frac{2gh}{3}}$ $\sqrt{\frac{8gh}{3}}$ (b) 0.633 m.
10. (a) - (b) $\omega = 0$, $\omega = \sqrt{\frac{k}{J}}$, $\omega = \sqrt{\frac{2k}{J}}$.
11. (a) 3/2 $l\omega$, $\omega/2$; (b) $-\frac{\sqrt{3}}{4}mg$.
12. (a) - (b) $\frac{\omega}{\omega_n} = 0.90, 1.28$; 62° and 142° leading (c) 2.64.

MPJ