



Complete, fold and seal
(see note 2 below)

SURNAME: Frampton

FORENAME(S): Jack

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	2413011
2	Title of Examination Paper	Physics (OME)
3	Module Code	ACDB4007
4	Date and Time of Examination	09:00 7/5/25
5	Examination Venue	1Q310
6	Seat Number	10
7	Number of Answer Books handed in	1

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

① ② cylindrical

$$\frac{v}{\sqrt{2E}} = \left[\frac{m}{c} + \frac{1}{2} \right]^{-\frac{1}{2}}$$

$$\frac{v}{3100} = \left[\frac{4}{10} + \frac{1}{2} \right]^{-\frac{1}{2}}$$

$$\frac{v}{3100} = 1.054092553$$

$$v = 3267.69 \text{ ms}^{-1}$$

to 2 d.p.

⑥ ~~8~~ ~~7~~ ~~6~~ ~~5~~ ~~4~~ ~~3~~ ~~2~~ ~~1~~ $ft = m(v-u)$

$$= 2(15-0)$$

$$ft = 30 \text{ N} \text{ NS}$$

$$F = ?$$

② @ True strain will not deform in uniform. The material will not disperse equally. ✓

Area = Constant

⑥ Modulus of Elasticity = $200 \times 10^9 \text{ Pa}$

Cross-sectional area = $5 \times 10^{-2} \text{ cm}^2 = 5 \times 10^{-6} \text{ m}^2$ ✓

natural length = 0.3m

$E = \text{Stress} / \text{Strain}$ ✓

Stress = Force / Unit area ✓

total = ①

③ a) $Q = m C \Delta T$

$Q = 2 \times 400 \times 30$

$Q = 24000 \text{ J}$

8

b) 700g of gas = 0.7 kg

$Q = m C \Delta T$

+ DW

$\Delta Q = \Delta U + \Delta W$

$600 = 0.7 \times 150 \times \Delta T + 350$

$\frac{600}{0.7 \times 150} = \Delta T$

$\Delta T = 5.71 \text{ K}$

~~2.38 K~~

8

Total 15

④ a) $T = I \ddot{\theta}$

$200 = 200 \times \ddot{\theta}$

$\ddot{\theta} = \frac{200}{200}$

$\ddot{\theta} = 1 \text{ radians s}^{-2}$

8

b) de Broglie $p = h / \lambda$

$\lambda = h / p$

$$\lambda = h / p$$

$$= 6.626 \times 10^{-34} / (9.109 \times 10^{-31} \times 1.6 \times 10^6)$$

~~$$\lambda = 7.3 \times 10^{-4}$$~~

$$\lambda = 7.3 \times 10^{-4} \text{ Hz}$$

5 @ i



total = 14

0

$$\textcircled{\text{ii}} \quad \lambda_{\text{peak}} = \frac{2.898 \times 10^{-3}}{T} \quad T = 1500^\circ\text{C}$$

$$\lambda_{\text{peak}} = \frac{2.898 \times 10^{-3}}{1773.15}$$

$$1500 + 273.15 = 1773.15 \text{ K}$$

$$= 1.6 \times 10^{-6} \text{ Hz m wavelength}$$

$$\textcircled{\text{b}} \quad \text{Temperature} = 500^\circ\text{C} = 773.15 \text{ K}$$

$$\dot{q} = A \epsilon \sigma T^4$$

$$\dot{q} = 0.7 \times 5.67 \times 10^{-8} \times 0.8 \times 3.57 \times 10^4$$

$$\dot{q} = 11335.46 \text{ Watts}$$

total = 11