



THE UNIVERSITY *of* EDINBURGH
School of Engineering

CODE12345 Course Title — Month Year (Diet)

This exam paper consists of THREE sections
Candidates should attempt ALL FIVE questions

Candidates should answer exam sections in separate books
A formula sheet is included at the end of the paper

Notes for the ETO

This is a temporary cover page, please replace it
This exam is 95 marks in total and has FIVE questions
Candidates should attempt ALL FIVE questions
This is a CLOSED-book exam
Use of calculators approved by the College of Science and Engineering is permitted

SoE Exam Template, version 1.1, 20-Feb-2020

SECTION A

Question A1

One of these things is not like the others; one of these things is not the same. Which one is different? (5)

- John
- Paul
- George
- Ringo
- Socrates

Question A2

And this is a completely new multiple choice questions. Which of these options is Red? (5)

- Blue
- Redish
- Yellow
- White
- Red

Question A3

And this is a completely new multiple choice questions. Which of these options is longer? (5)

- Some long text can go here
- Red
- And the text here can be even longer if you want, you can even add equations such as $F = ma$.
- White
- Blue

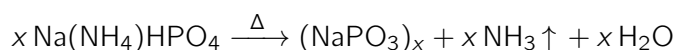
SECTION B
Question B1

Write the main text for the question here. This is an example of an inline equation: $F = ma$, where F is the force, or $E = \frac{1}{2}mv^2$. For SI units use: the force is $F = 1.0 \text{ N}$ or $F = 2.0 \text{ N}$ and the velocity is $v = 3.4 \text{ m/s}$. To add a table to the questions use:

Table B1: This is the caption for this table.

Item		
Property	Value	Units
Force	1.0	N
Acceleration	3.4	m/s^2
Temperature	-250	K
Energy	200	J
Potatoes	Frozen	Count

With this version of the exam paper template it is also possible to add chemical symbols such as H_2O or displayed chemical symbols or reactions, such as



- (a) This is the text of a part of a question, with a reference to figure B1 below ...
 - i) This is a subpart of a question (7)
 - ii) And this is another subpart of a question, another subpart of a question. And this is another subpart of a question. And this is another subpart of a question. And this is another subpart of a question. (3)
- (b) This is the text of a part of a question ... (5)
- (c) This is the text of a part of a question ... (5)



Figure B1: This is the caption for this question.

Question B2

Write the main text for the question here ...

- (a) This is the text of a part of a question ... (3)
- (b) This is the text of a part of a question ... (5)
- (c) This is the text of a part of a question ... (7)
- (d) This is the text of a part of a question ... (5)



Figure B2: This is the caption for this question.

SECTION C

Question C1

Write the main text for the question here ...

- (a)** This is the text of a part of a question ... **(3)**
- (b)** This is the text of a part of a question ... **(5)**
- (c)** This is the text of a part of a question ... **(7)**
- (d)** This is the text of a part of a question ... **(5)**

Question C2

Write the main text for the question here ...

- (a) This is the text of a part of a question ... (3)
- (b) This is the text of a part of a question ... (5)
- (c) This is the text of a part of a question ... (7)
- (d) This is the text of a part of a question ... (5)



Figure C2: This is the caption for this question.

END OF EXAM

Formula Sheet

Course Title (CODE12345)

Month Year (Diet)

Title of group of formulas

$$\frac{d}{dt} \left(\frac{\partial T}{\partial \dot{q}_i} \right) - \frac{\partial T}{\partial q_i} + \frac{\partial V}{\partial q_i} = Q_i$$

$$T = \frac{1}{2} m \dot{x}^2$$

$$T = \frac{1}{2} I \dot{\varphi}^2$$

$$V_e = \frac{1}{2} k \Delta x^2$$

$$V_e = \frac{1}{2} k_t \Delta \alpha^2, \quad k_t = \frac{G \pi d^4}{32L}$$

$$V_g = mgh$$

$$\delta W_i = Q_i \delta q_i$$

Analytical dynamics

$$\frac{d}{dt} \left(\frac{\partial T}{\partial \dot{q}_i} \right) - \frac{\partial T}{\partial q_i} + \frac{\partial V}{\partial q_i} = Q_i$$

$$T = \frac{\rho A}{2} \int_0^L \left(\frac{\partial w}{\partial t} \right)^2 dx$$

$$V_e = \frac{EI}{2} \int_0^L \left(\frac{\partial^2 w}{\partial x^2} \right)^2 dx$$

$$V_g = \rho Ag \int_0^L w(x, t) dx$$

$$Q_i = \varphi_i(b)F$$

$$Q_i(t) = \int_0^L \varphi_i(x) f(x, t) dx$$

Longitudinal waves

$$\frac{\partial^2 \phi}{\partial t^2} = c^2 \left(\frac{\partial^2 \phi}{\partial x^2} \right)$$

$$\frac{\partial^2 u}{\partial t^2} = \frac{E}{\rho} \left(\frac{\partial^2 u}{\partial x^2} \right)$$

$$\frac{\partial^2 w}{\partial t^2} = \frac{T}{\mu} \left(\frac{\partial^2 w}{\partial x^2} \right)$$

$$\frac{\partial^2 \theta}{\partial t^2} = \frac{G}{\rho} \left(\frac{\partial^2 \theta}{\partial x^2} \right)$$

$$u(x, t) = f(x)g(t)$$

Transverse waves

$$\frac{\partial^2 w}{\partial t^2} + \frac{\partial^2}{\partial x^2} \left(\frac{EI}{\rho A} \frac{\partial^2 w}{\partial x^2} \right) = 0$$

$$\rho A \frac{\partial^2 w}{\partial t^2} + EI \frac{\partial^4 w}{\partial x^4} = 0$$

$$w(x, t) = B \sin \left[\frac{2\pi}{\lambda} (x - ct) \right]$$

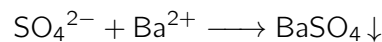
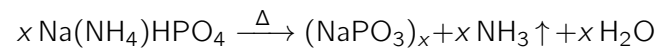
$$w(x, t) = \phi(x) \cos(\omega t)$$

$$\frac{\partial^4 \phi(x)}{\partial x^4} - k^4 \phi(x) = 0$$

$$\omega = \frac{2\pi c}{\lambda}, \quad f = \frac{c}{\lambda}$$

$$k^4 = \frac{\rho A \omega^2}{EI}, \quad k = \frac{\omega}{c}$$

Chemical reactions



Tables and data

Item		
Property	Value	Units
Force	1.0	N
Acceleration	3.4	m/s ²
Temperature	-250	K
Energy	200	J
Potatoes	Frozen	Count