



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Examination Answer Books

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, fold over 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.**

Complete, fold and seal
(see note 2 below)

SURNAME: Smith

FORENAME(S): James

1	Student Number	1801879
2	Title of Examination Paper	Engineering Science
3	Module Code	M4X02192
4	Date and Time of Examination	3/5/2019 11 o'clock
5	Examination Venue	IQ 206 106
6	Seat Number	
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use	
1	3	8
2	11	11
3	10	10
4	10	10
Total	34	39

Inv'd Tim Tudor

Very good!

87%



① $A = 600\text{mm} \times 465\text{mm} = (0.6 \times 0.465)\text{m}^2 = 0.279\text{m}^2$
 $Q = 1100\text{W/m}^2\text{K}$
 $h = 55\text{KW} = (55 \times 10^3\text{W})$ ✓ ②

$$Q = h \times A (T_2 - T_1)$$

$$\frac{Q}{h \times A} = (T_2 - T_1)$$

$$\frac{1100}{55 \times 10^3 \times 0.279} = (T_2 - T_1)$$

$$0.072 = (T_2 - T_1)$$

①

Temperature difference = 0.072

radiant

Not a measure of temperature.

② $F = 250\text{N}$
 $x = 2\text{mm} = (2 \times 10^{-3}\text{m})$
 $r = 100\text{mm} = (0.1\text{m})$
 $A = (400 \times 25) = (400 \times 25)\text{mm} = (0.4\text{m} \times 0.025\text{m}) = 0.01\text{m}^2$

A) $\gamma = \frac{F}{A} = \frac{250}{0.01} = 25 \times 10^3\text{N/m}^2$ ✓

B) $\gamma = \frac{x}{r} = \frac{2 \times 10^{-3}}{0.1} = 0.02$ (no units) ✓

C) $K = \frac{\gamma}{\gamma} = \frac{25 \times 10^3}{0.02} = 12.5 \times 10^5\text{N/m}^2 = 1.25 \times 10^6\text{N/m}^2$ ✓

11/11

③

$$l = 0.75 \text{ m}$$

$$T = 1200 \text{ Nm}$$

$$r = 0.0005 \text{ radians}$$

$$G = 210 \text{ GPa/m}^2 \quad (210 \times 10^9 \text{ N/m}^2)$$

$$\frac{T \times l}{J} = \frac{G \theta}{l}$$

$$\frac{T \times l}{G \theta} = \frac{G \theta \times l}{G \theta}$$

$$\frac{T \times l}{G \theta} = J$$

$$\frac{T \times l}{G \theta} = \frac{\pi D^4}{32}$$

$$\frac{32 T \times l}{G \theta} = \frac{\pi D^4}{\pi}$$

$$\frac{32 T \times l}{G \theta \pi} = D^4$$

$$D = \sqrt[4]{\frac{32 T \times l}{G \theta \times \pi}}$$

$$D = \sqrt[4]{\frac{32 \times 1200 \times 0.75}{210 \times 10^9 \times 0.0005 \times \pi}}$$

$$D = 0.097 \text{ m}$$

$$\text{Shaft Diameter} = 0.097 \text{ m}$$

✓
Nice!

10/10

④

$$F = 273 \text{ N}$$

$$x = 0.0035 \text{ mm} (3.5 \times 10^{-6} \text{ m})$$

$$l = 0.25 \text{ m}$$

$$D = 15 \text{ mm} (0.015 \text{ m})$$

$$A = \frac{\pi D^2}{4} = \frac{\pi \times 0.015^2}{4}$$

$$A = 1.77 \times 10^{-4} \text{ m}^2$$

$$E = \frac{x}{l} = \frac{3.5 \times 10^{-6}}{0.25 \text{ m}} = 1.4 \times 10^{-5} \text{ (no units)}$$

$$\sigma = \frac{F}{A} = \frac{273}{1.77 \times 10^{-4}} = 1.54 \times 10^6 \text{ N/m}^2$$

$$E = \frac{\sigma}{\epsilon} = \frac{1.54 \times 10^6}{1.4 \times 10^{-5}} = 110 \times 10^9 \text{ Nm}^2 \text{ or } 110 \text{ GPa/m}^2$$

✓
lovely!

10/10

Question No.

Examiner On

Arholwr yn unig

fy Cwestiwn

Question No.

Examiner On

Arholwr yn unig

Arholwr yn unig

Question No.

Examiner Only

Arholwr ym unig

Rhif y Cwestiwn

Question No.

Examiner On

Arholwr yn unig

ntif y Cwestiwn

Question No.

Examiner Only

Question No.

Examiner On

Arholwr yn unig

hif y Cwestiwn

Question No.

Examiner Only

Arholiwr yn unig

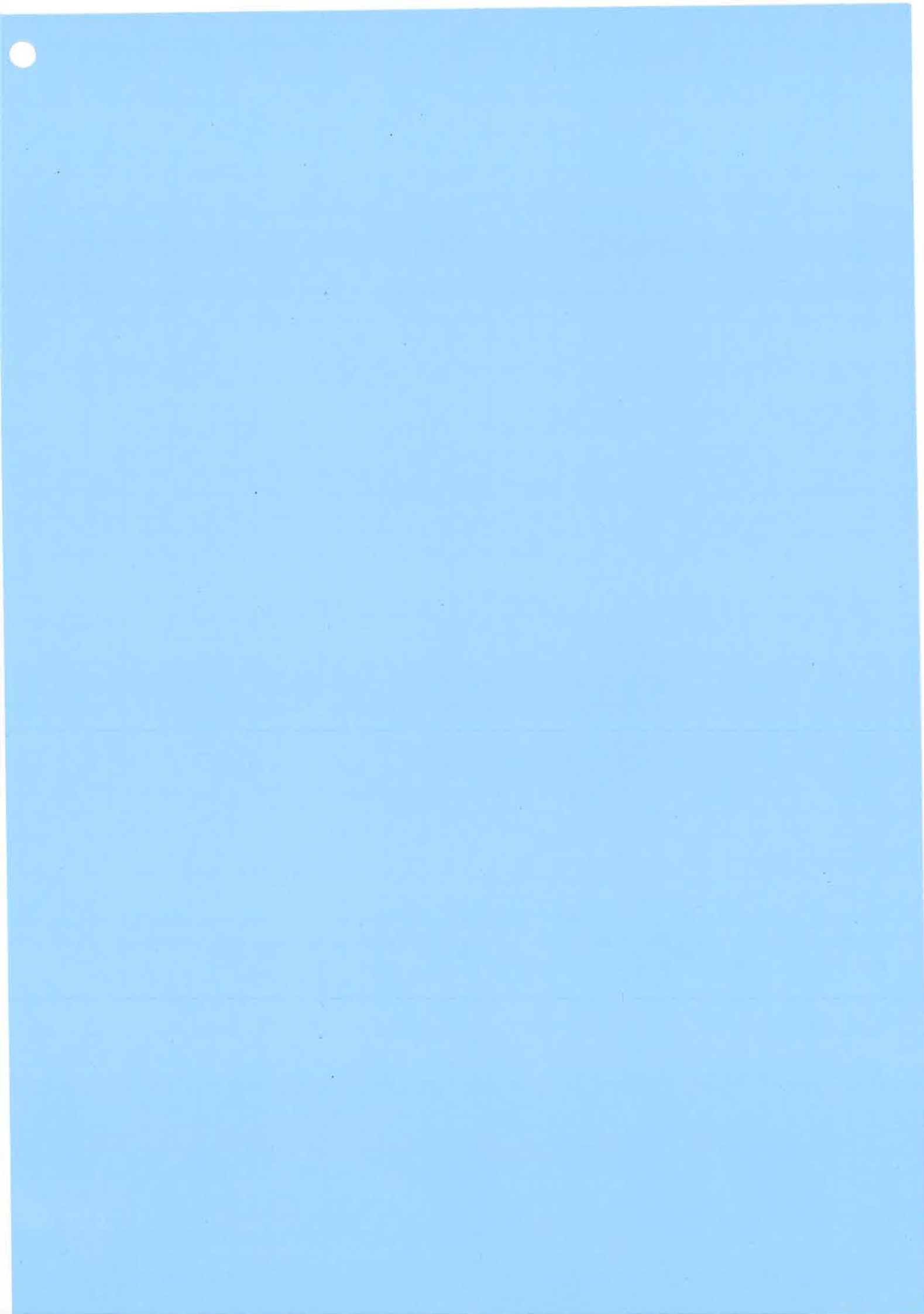
Rhif y Cwestiwn

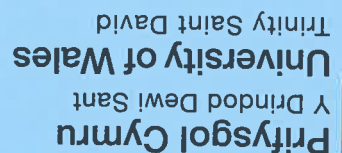
Question No.

Examiner Only

Arholwr yn unig

Y Cwestiwn





12 Tudalen

1. Rhwch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhwch eich enw yn y lle a ddarparwyd ar y dde, plygwch ef a'i sello i lawr (gan ddefnyddio'r label a ddarparwyd) i guddio'ch enw.

1. Rhaid i'r atebion fod mewn llawysgrifen ddarllenadwy. Gall yr Arholwyr naill ai anwybyddu sgrïpt annarllenadwy, neu drefnu iddi gael ei theipio a chael yr ymgeisydd i dalu.
2. Ysgrifennwch eich atebion mewn inc.
3. Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gael oddi wrth y gwyllwyr/gwylwyr.
4. Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.
5. Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gael oddi wrth y gwyllwyr/gwylwyr.
6. Rhaid dychwelyd pob llyfr. Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arholi o dan unrhyw amgylchydau.

7	Nifer y Llyfrau Atebion a gyflwynwyd	
6	Rhif Sedd	
5	Lleoliad yr Arholiad	
4	Dyddiad ac Amser yr Arholiad	
3	Cod y Modwl	
2	Teitl y Papur Arholiad	
1	Rhif Myfyriwr	

[illegible]

(See the other side for English version)

Llenwch, plygwch a seliwch
(gweler nodyn 2 isod)

CYFENN:

ENW(AU) CYNTAF:

ENW(AU) CYNTAF: