

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

Complete, fold and seal
(see note 2 below)

SURNAME: Evans

FORENAME(S): Kieren

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.

1	Student Number	EVA22869015
2	Title of Examination Paper	Dynamics control and instrumentation
3	Module Code	GOEE4002
4	Date and Time of Examination	13 May 2025 9:31
5	Examination Venue	Tycoed, main hall
6	Seat Number	E10
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
Q1	6 ✓
Q2	5 ✓
Q3	0 ✓
Q4	2 ✓
Q5	0 ✓
Total	11

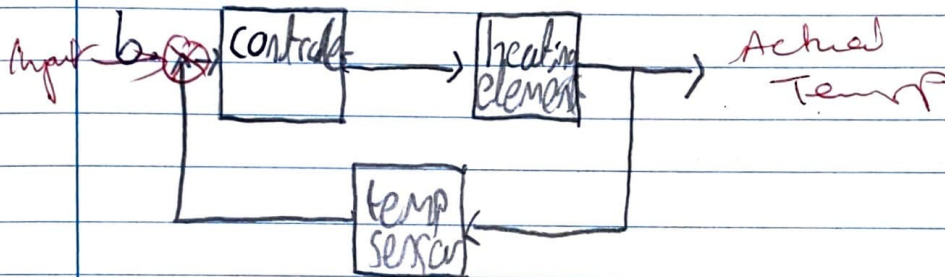
11% E3
✓
RK

a.



(2)

ii. When the temperature sensor notices the temperature drop the information is sent to the controller and will control the heating element by increasing the heat. It will attempt to reach or close to the ideal temperature with as little steady-state error as possible.



(2)

c. i. Closed loop transfer Function:

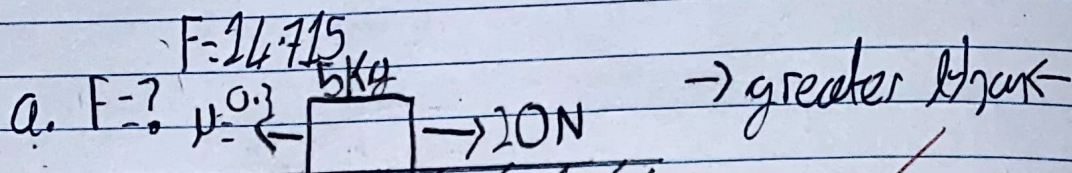
$$T(s) = \frac{Y(s)}{R(s)} = \frac{G(s)H(s)}{1 \pm G(s)H(s)}$$

(1)

(5)

EN

2



Newton's second law: $F_{\text{net}} = ma = m \frac{dv}{dt}$

Friction: $F_f = \mu \cdot m \cdot g$
 $= 0.3 \times 5 \times 9.81 = 14.715\text{N}$

$a = \frac{5}{5.285} = 0.946\text{m/s}^2$

$C. F_{\text{net}} = ma$
 $\frac{8 \times 2}{5 \times 8} = 16\text{N}$
 $23 \times 2 = 26\text{N}$

d. $2\text{m/s} \times 5\text{s} = 10\text{m}$

include formula

$10 \times 0.01 = 0.1 = 0.1\text{V}$ or 100mV after 5s

Question No.

3

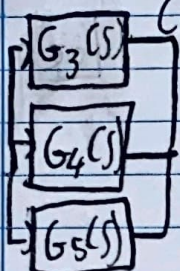
Examiner Only

4 combining series blocks
 $\rightarrow G_1(s) \rightarrow G_2(s) \rightarrow G_3(s)$

becomes

$$\rightarrow G_1(s) G_2(s) G_3(s) \text{---} \textcircled{1}$$

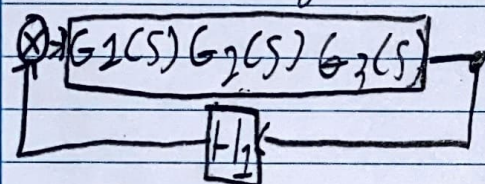
combining parallel blocks



becomes

$$\rightarrow G_3(s) + G_4(s) + G_5(s) \text{---} \textcircled{1}$$

Eliminating Feedback loop H_1 and H_2



becomes

$$\frac{G_1(s) G_2(s) G_3(s)}{1 + G_1(s) G_2(s) G_3(s) + H_1(s)}$$

$$\frac{G_1(s) G_2(s) G_3(s)}{1 + G_1(s) G_2(s) G_3(s) + H_1(s)} \rightarrow \frac{G_3(s) + G_4(s) + G_5(s)}{1 + G_1(s) G_2(s) G_3(s) + H_1(s)}$$

becomes

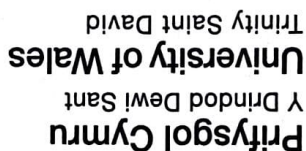
$$\frac{G_1(s) G_2(s) G_3(s)}{1 + G_1(s) G_2(s) G_3(s) + H_1(s)} \times \frac{G_3(s) + G_4(s) + G_5(s)}{1 + G_1(s) G_2(s) G_3(s) + H_1(s)}$$

Question No.

5.

Examiner Only

0



12 Tudalen

Cyfarwyddiadau i Ymgeiswyr

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

3. Rhaid i'r atebion fod mewn llawysgriften ddarllenadwy. Gall yr Arholwyr naill ai anwybyddu sgrifft annarllenadwy, neu drefnu iddi.

4. Ysgirfennwch eich atebion mewn inc.

5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw fras nodiadau yn y llyfr atebion a thynnu llinell drwyddynt.

6. Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.

7. Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gael oddi wrth y gwylw/gwylwyr.

8. 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 amgylchiadau.

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

Cyfanswm	
Rhestrwch ffur'r cwestiynau a ymgelstwyd gennych	At Dibenion y Swyddfa

(See the other side for English version)