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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	170751411
2	Title of Examination Paper	Dynamics + control + instrumentation
3	Module Code	4005 - 006
4	Date and Time of Examination	16/05/18
5	Examination Venue	Main hall Llysoch
6	Seat Number	4
7	Number of Answer Books handed in	

Complete, fold and seal
(see note 2 below)

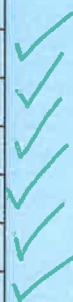
SURNAME:

Dwy

FORENAME(S):

TOMOS IYON

List the numbers of the questions you have attempted	Office Use
Q1	0
Q2	2
Q3	0
Q4	0
Q5	0
Q6	1
Total	3



= 100% ✓

1) Δ lag.
 horizontal ~~displacement~~
 A
 S displacement.

gravity 9.81

U 80 m/s cos 40 initial

$$V = at^2$$

V 80 m/s cos 40 final

$$S = UV \times \frac{1}{2} at^2$$

a 9.81 ^{m/s} acceleration

$$at^2 = V$$

T 0.487 s time

$$T^2 = \frac{V}{a}$$

$$a = \frac{V}{T}$$

$$A) T^2 = \frac{80 \cos 40}{9.81}$$

$$T^2 = 6.24$$

$$T = 0.487 \text{ secs}$$

$$B) S = 80 \cos 40 \times 80 \cos 40 \times \frac{1}{2} \times 9.81 \times 0.487^2$$

$$S = 4369.02 \text{ m}$$

$$2) \quad A \quad S = 17t^2 + 10t$$

$$B \quad S = 9t^2 + 30$$

$$\begin{array}{r} 34 \\ 18 \\ 17 \quad 34t \\ 9 \quad 18t \end{array}$$

$$A) \quad \frac{dS}{dt} \quad A = 34t + 10 \quad \checkmark$$

$$B = 18t \quad \checkmark$$

$$SA = 170t + 50$$

$$SB = 90t$$

$$b) \quad t \geq 0$$

$$S = \frac{\text{distance}}{\text{Time.}}$$

$$AS = 17 \times 0 + 10 \times 0 = 0 \text{ seconds.}$$

$$B = 9 \times 0 + 30 = 30 \text{ seconds.}$$

$$T = 4$$

$$17 \times 4 = 68 + 10 \times 4 =$$

2.
✓

0

$$3) \quad M=5 \quad C=3 \quad k=10$$

$$M=5 \times 1 \quad C=3 \times 2 \quad k=10 \times 3$$

$$=5 \quad =6 \quad =30$$

$$a) \quad x(t) = \cancel{\frac{1}{30}} \times M \times 30 \cancel{\text{...}}$$

$$e^{-\alpha t} \leftarrow \frac{1}{s+5} \times \frac{1}{s^2+8s+7}$$

$$b) \quad 5 \times 3 = 15 \times 10 = 150 \text{ Hz}$$

$$c) \quad \cancel{\text{...}} \quad \cancel{\text{...}} \quad x(t) \quad M \times \cancel{\text{...}} \times \cancel{\text{...}}$$

$$d) \quad \text{over damped.} \quad \times$$

0
✓

$$4) \begin{aligned} A &= S = -5 \\ B &= S = -8 \\ C &= S = -1 \end{aligned}$$

$$\frac{1}{-5} = -0.2$$

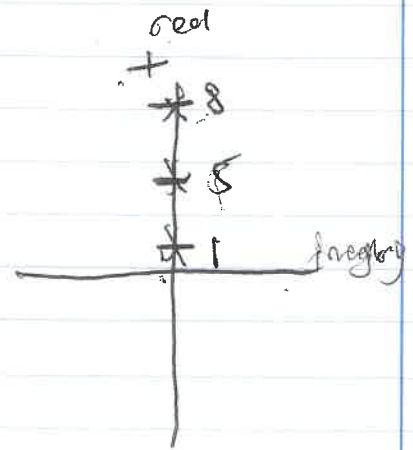
$$\frac{1}{-8} = -0.125$$

$$\frac{1}{-1} = -1$$

~~ASAS~~ $A = 0$

$$B = -3$$

$$C = +4$$



0

$$OS = 0(-5+5) - 3(-8+8) + 4(-1)$$

4)

A)

$$G_S = \frac{S+5}{S^2+8S+7}$$

b)

~~at~~ ~~1~~ ~~8~~ ~~4~~ ~~1~~

$$\frac{A}{(S+5)}$$

$$\frac{B}{S+8}$$

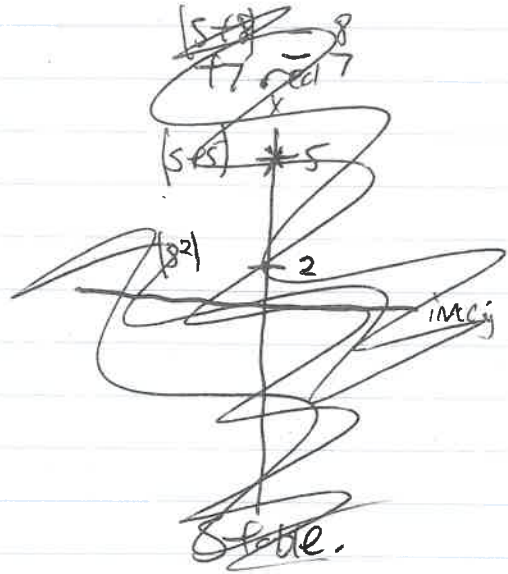
$$\frac{C}{S+1}$$

$$G_S = A(S+8) + B(S+5) + C(S+1)$$

$$c) G_S = \frac{3A(S+5) + 3B(S+8) + 3C(S+1)}{2}$$

$$= \frac{(S+15) + (S+24) + (S+3)}{2}$$

~~8~~ ~~8~~ ~~8~~ ~~8~~ ~~8~~



0 ✓

Q5)

$$a) \quad 2s^5 + 3s^4 + 2s^3 + s^2 - s + 4 = 0$$

$$\begin{array}{r} s^5 \quad 2 \quad 2 \quad -1 \quad 0 \\ s^4 \quad 3 \quad 1 \quad 0 \quad 4 \\ s^3 \quad 1.3 \quad -1 \quad 0 \\ s^2 \quad 1.307 \quad 0 \quad 0 \\ s^1 \quad 1.05 \quad 0 \\ s^0 \quad 0 \end{array}$$

≥ 0 poles

Unstable.

$$\begin{array}{l} 3 \times 2 = 6 \\ 2 \times 1 = 2 \end{array} \quad \frac{6-2}{3}$$

$$\begin{array}{l} |x-1 \\ 2 \times 0 = 0 \end{array} \quad \frac{-1}{1}$$

$$\begin{array}{l} 1.3 \times 1 = 1.3 \\ 3 \times -1 = -3 \\ = 1.7 \\ \hline 1.3 \end{array}$$

$$\begin{array}{l} 1.307 \times -1 = -1.307 \\ 1.3 \times 0 = 0 \end{array}$$

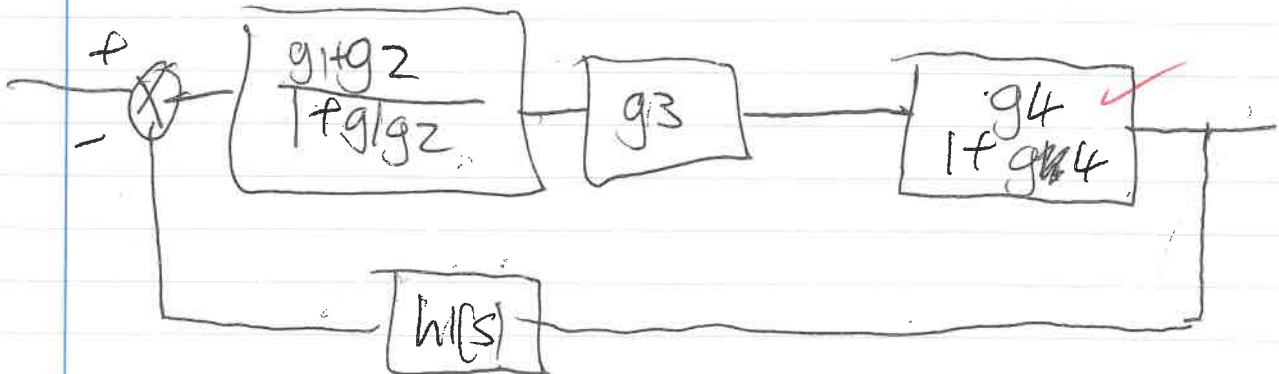
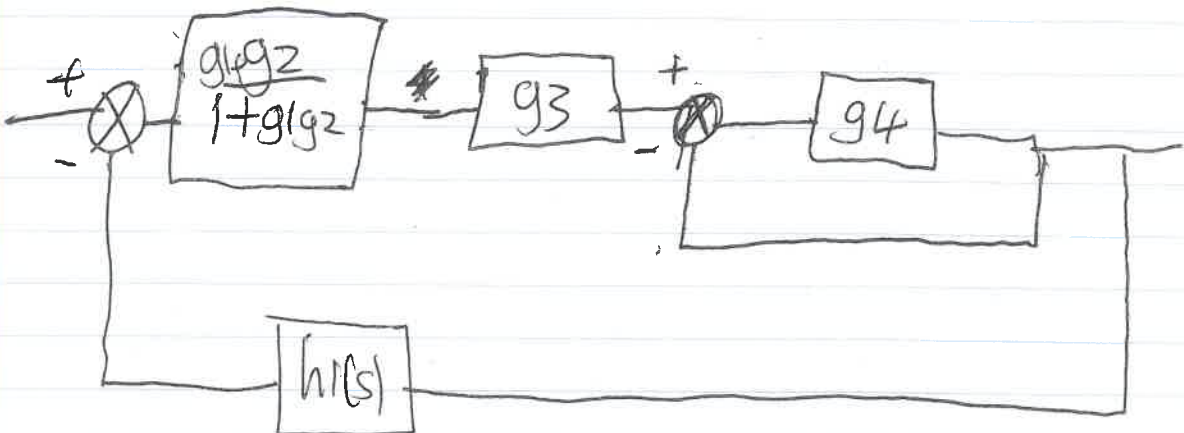
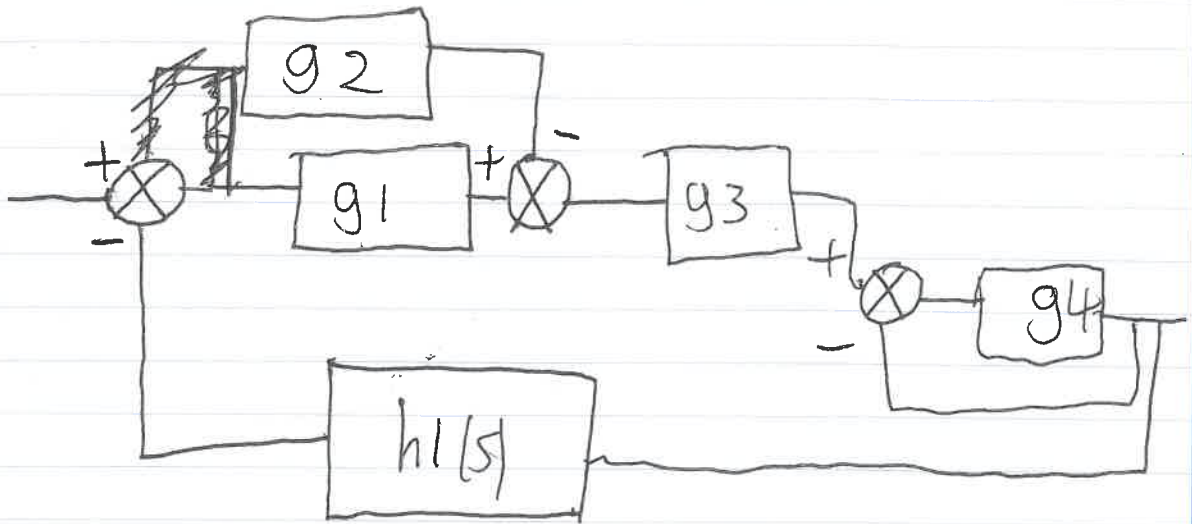
$$\frac{1.307}{1.3}$$

~~1.307~~

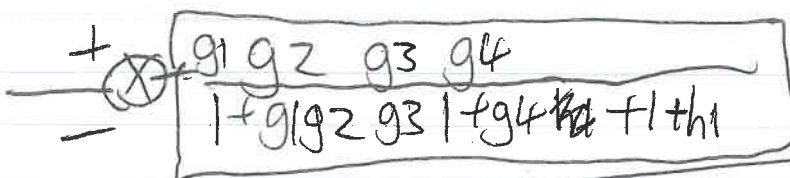
0

✓

Q6
A



① ✓



42

$$f1 \quad \frac{g_1 g_2 g_3 g_4}{1 + g_1 g_2 g_3 + g_4 + 1 + h_1}$$