

Problem 1.

part (a) 5 marks. Almost everybody got the FBD right.

1 mark taken off for each force left out.

parts (b) & (c) Almost everyone got the relationship between a & T correctly (+ 5 marks)

Those (maybe 10%) who did not find the T correctly lost 2-5 marks (depending on the seriousness of their error).

Problem 2.

part (a) 15 marks. = 5 marks (for FBD) + 5 (for eqns of motion) + 5 (for correct MATLAB).

- Almost everybody got the FBD right (nearly)
But a few of these (~30%) got the force on the 2nd block from the last spring incorrect (-2 marks)
- Almost all (but for 15-10 people) got the equations incorrect after getting the FBD right (-3 to -5 marks)
- Almost all got (but for 10-15 people) got the MATLAB code almost correct.
The only error being the ~~dis~~ correct display of the desired output. (-1 mark)

part (c) Quite a few mentioned eigenvectors
(5 marks). (about 70%) (got 1-2 marks).

Very few got it absolutely right (5-10 max)

~~Nobody~~ actually

1 person actually found the
eigenvectors & eigenvalues.

Q3] 0) part

correct FBD + assumptions + mechanics eqns = 10pts 30
 no assumptions $\rightarrow$ $\boxed{-1}$ 60%
 no unmarked forces $\rightarrow$ -1 10%
 friction force opposite dir $\rightarrow$ -3 5%
 wrong assumptions $\rightarrow$ -1 10%
 friction wrong position $\rightarrow$ -3 5%

a) correct answer $\rightarrow$ 5 40%
 sign error $\rightarrow$ -1 10%
 wrong equation $\rightarrow$ -2 10%
 missing one term $\rightarrow$ -2 -1 40%

b) correct answer $\rightarrow$ 5 30%
 correct assumption (ie $a=0$) 70%
 wrong answer $\rightarrow$ 3 70%
 wrong assumption ($a=0$) 20%
 $\rightarrow$ 1 - 2
 sign errors $\rightarrow$ -0.5 -1 10%

c) Correct answer $\rightarrow$ 5 25%
 correct assumption ^($F=0$) wrong answer 70%
 $\rightarrow$ 3
 wrong assumption $\rightarrow$ 1 - 2 30%
 sign error $\rightarrow$ -0.5 -1 10%
 answer in terms of F (unknown) $\rightarrow$ 3 60%
~~70%~~

note

Q4

Correct answer $\rightarrow (20)$

a) FBD $\rightarrow (4)$

50%

- No reaction forces $\rightarrow -3$

5%

- wrong reaction forces $\rightarrow -2$

45%

b) AMB $\rightarrow (2)$

90%

c) finding $\sum M_A \rightarrow 2$

50%

d) finding $\dot{h}_A \rightarrow 4$

50%

e) correct $a_g \rightarrow 2$

60%

f) correct calculation $\rightarrow 2$

g) incorrect answer $\rightarrow 1 - 3.5$

70%

Q5

Correct answer $\rightarrow 20$

30%

a) correct FBD $\rightarrow 5$

80%

b) sign error in answer $\rightarrow -2$

10%

c) gravity not neglected $\rightarrow -2$

10%

d) Answer