

~~DATE~~

HILL

DYNAMICS

**Design of Electrical Installations
HNC/HND in Electrical and Electronic
Engineering**

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$$R = 6$$

$$S = 16$$

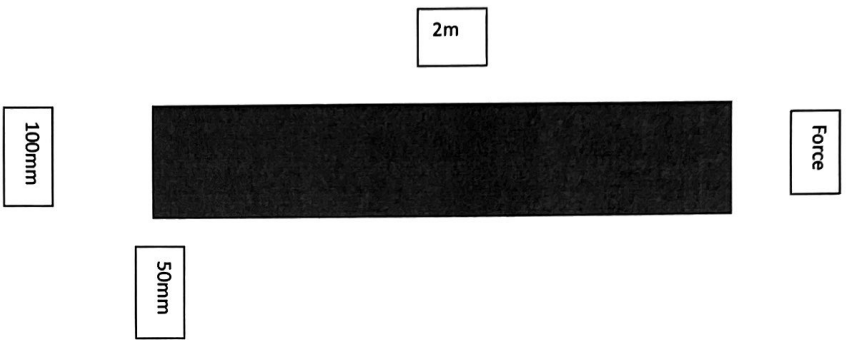
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Introduction

There was a task set to calculate the mathematical equations to find out the force of an object and to define what is happening throughout the object. Whilst finding out the force provided the velocity and the acceleration will also need to be calculated as well. There will also be terms explained to help with the knowledge of the object and what happens with the feedback.



Workings out

$$F_{net} = Ma$$

$$F_{net} = F + (-F_f)$$

$$100 - 50 = 50$$

$$\frac{50}{2} = 25m/s^2$$

1.5MN and 2.5MN

Displacement

(academy, 2023) The definition of Displacement is the change of the position of the object. When it says displacement it means the object may have been moved or that the object has been displaced in the wrong position.

Velocity

(byjus, 2023) The definition of velocity is the change on an objects position. Velocity is speed in a specific direction which needs magnitude and the direction to define it. When the velocity is found it will be measured in metres per second with the mathematic term it will be m/s.

Acceleration

(academy, khan academy, 2023) The definition of Acceleration is the change of speed. It shows that the speed is changing within the object. When the velocity is changing that's when the speed changes and that will be called acceleration. When the velocity is calculated the acceleration may need to be calculated to see if the speed changed within the object.

Task 1

0.

2

(2)

$$S = 3t^3 - 24t + 6$$

$$\checkmark = \text{First} = 9t^2 - 24$$

$$\text{second} = 18t$$

$$60va = 9t^2 - 24 = 60(3t^3 - 24)$$

$$9t^2 - 24 = 180t^3 - 1440$$

$$9t^2 - 180t^3 = 24 - 1440 = 9t^2 - 180t^3 - 1416 = 0$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{- -180 \pm \sqrt{-180^2 - 4(9)(-1416)}}{2(9)}$$

$$+ = 17.57$$

$$- = 2.43$$

$$b) \text{ Acceleration when } v = 35 \text{ m/s}$$

$$18t = 35$$

$$\frac{35}{18} = 1.94 \text{ s}$$

$$c) t = 2 \text{ to } t = 4 \text{ s}$$

$$3(2)^3 - 24(2) + 6$$

$$3(8) - 48 + 6$$

$$24 - 48 + 6 = -18 \text{ m}$$

$$3(4)^3 - 24(4) + 6$$

$$3(64) - 96 + 6$$

$$192 - 96 + 6 = 102 \text{ m}$$

$$t_2 - t_1 = 102 - (-18) = 120 \text{ m}$$

Open loop

(xeryon, 2023) An open loop is to control the motion systems which means that there will most likely be no position feedback of the object. When the object moves with an open loop the system will not be able to present feedback.

Closed loop

(xeryon, 2023) A closed loop is to control some of the positions of the object and with the information that is held in the system it will send the feedback to the motion controller.

Overshoot

(analysis, 2023) Overshoot is a signal that exceeds its target which means when the object is placed it will send signals though it to get the right information.

Non-touching loop

(point, 2023) When the object is placed and it has a non-touching loop it means that they do not have a common node in it.

Setting time

(dialogue, 2023) Settling time is the time it takes from the beginning to the end of the object it will track the time it takes and use the feedback it comes back with and that will be the time it takes to complete the travel through.

Steady state error

(mellon, 2023) Steady state error is the difference of the input and the output of the object. With the steady state error it will all depend on the input of the object its working on.

PID

(skills, 2023) In every controlling system has its own unique number and that is called the process number (PID) it helps the control system work know what its working on.

1.5

2.5

Conclusion

In conclusion the task provided helps to learn how to calculate the force applied to an object and the explanations on how it works and what is happening with the positions and the feedback that the object is giving off. It also shows how to calculate the velocity and the acceleration by using the correct mathematic equations.