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subject = control Technology

Semesster = 5th (summer)

~~Section~~

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Date = 19/8/2020

Q:1

Part # (a)

Hand Exoskeleton Robotic system

Ans It presents full range of motion for all hand Phalanges and was specially design to carry out Position & force Position control for Passive & active rehabilation routines. system integration and Preliminary clincical tests are also Presented.

Function of each Part :—

(A) CAD drawing of the index finfure actuator
(B) Bending motion generated by the Proposed multi-segment mechanism with a spring Layer.
(C) segment Thickness (unit = 'mm') and
(D) overviewing of the Hand Exoskeletion Prototype

(2)

What if we remove control system from this robotic system:-

(Ans) If we remove the intergreted circuit or input source of the Hand Exoskeltion Robotic system It differ or not work To Perform.

or remove the ~~Exactor~~ actuators of each finfures.

(9)

(3)

Q:1

Part # (B) Process of Modeling

step # 01

Determine a Physical ~~function~~ system & specifications from the requirments.

step # 02

Draw a functional Block Diagram.

step # 03

Transform the Physical system into a schemeatic

step # 04

use the schematic to obtain a Block diagram signal-flow diagram or state space representation.

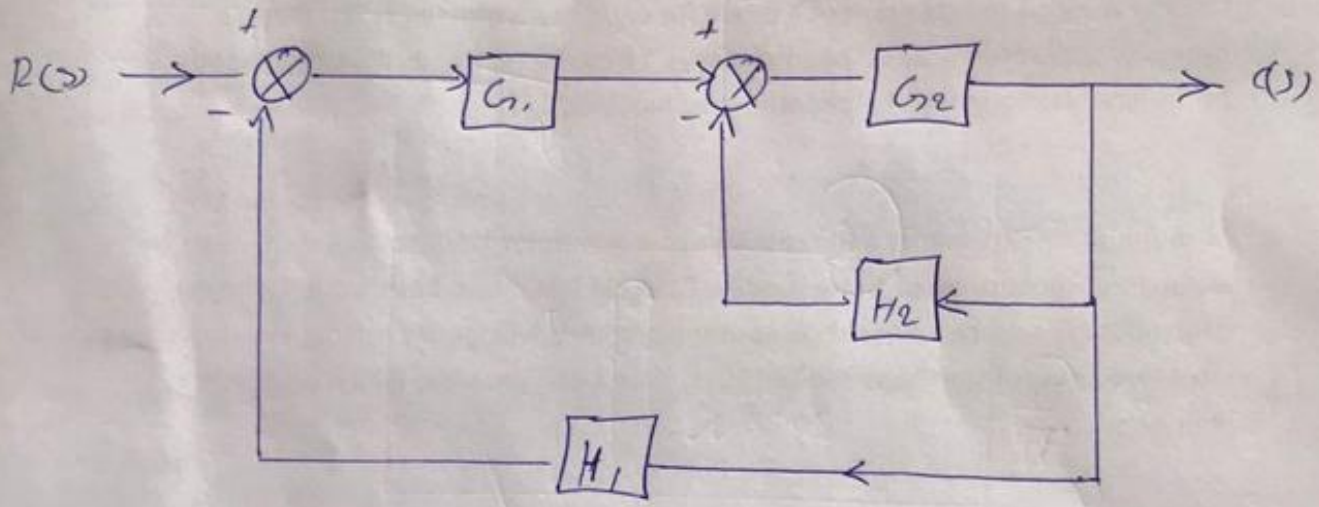
step # 05

If Multiple Blocks reduces the Block diagram to a single block or closed-loop system.

P-T-O

step # 06

Analyze, Design & Test to see that requirments & specifications are meet.



(b) Function of actuators :-

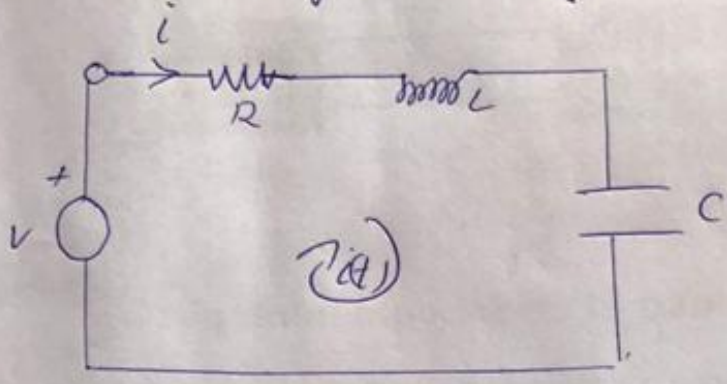
An actuators is a component of mechine that responsible for moving & controling a mechanism or system. An Actuators requires a control signal & source of energy

Q = 2

Part #(a)

Solve for Transfer function by using method of your own choice :-

Ans Method = Voltage Charge



KVL Applying

$$V(t) = RIT + \frac{L\,dI(t)}{dt} + \frac{1}{C}\int I(t)\,dt$$

$$V(t) = R\frac{dq\,t}{dt} + \frac{L\,dq^2(t)}{dt} + \frac{1}{C}q(t)$$

Apply Laplace T/F

$$\mathcal{L}\,V(s) = R\,\mathcal{L}\frac{dq(s)}{dt} + L\,\mathcal{L}\frac{d^2q}{dt} + \frac{1}{C}\mathcal{L}q(s)$$

$$V(s) = R(s)q(s) + L(s)^2 q(s) + \frac{1}{C}q(s)$$

⑥

$$V(s) = q(s)\left\{Rs + Ls^2 + \frac{1}{C}\right\}$$

$$\frac{q(s)}{V(s)} = \frac{RCs + LCs^2 + 1}{C}$$

$$\frac{q(s)}{Vs} = \frac{C}{RCs + LCs^2 + 1}$$

$$\boxed{\frac{q(s)}{V(s)} = \frac{C}{LC(s)^2 + RCS + 1}}$$

Solution

Q = 2

Part #(B)

Matlab Commands

=> LaPlace

```
>> syms t
>> f = t^4
>> laplace(f)
```

=> inverse LaPlace

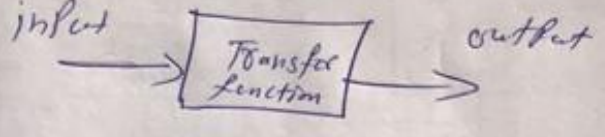
```
>> syms s
>> f = 1/s^2
>> ilaplace(f) % inverse laplace
```

$$H(s) = \frac{s+2}{s^2+5+10}$$

=> Transfer function :-

```
sys = tf(num,den) % Transfer function
```

Transfer function describe the input - output relationship.



output = TF * input

Q=3

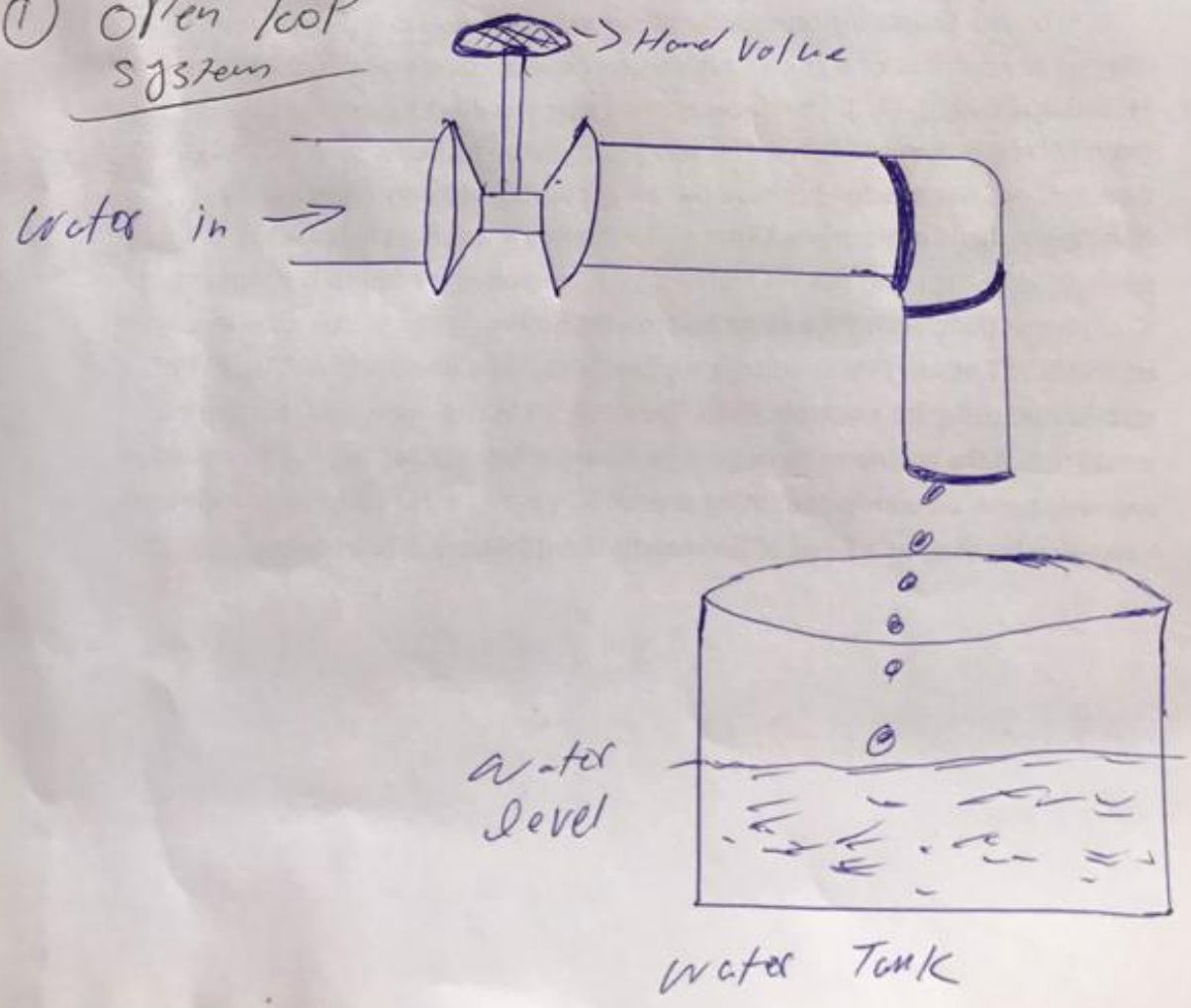
How can the level of water be controlled :-

Ans We have Two Technique To control the level of water

① water control system by open loop no feedback

② // // by closed loop. Feedback system

① Open loop system



(7) Closed loop system.

Feedback