

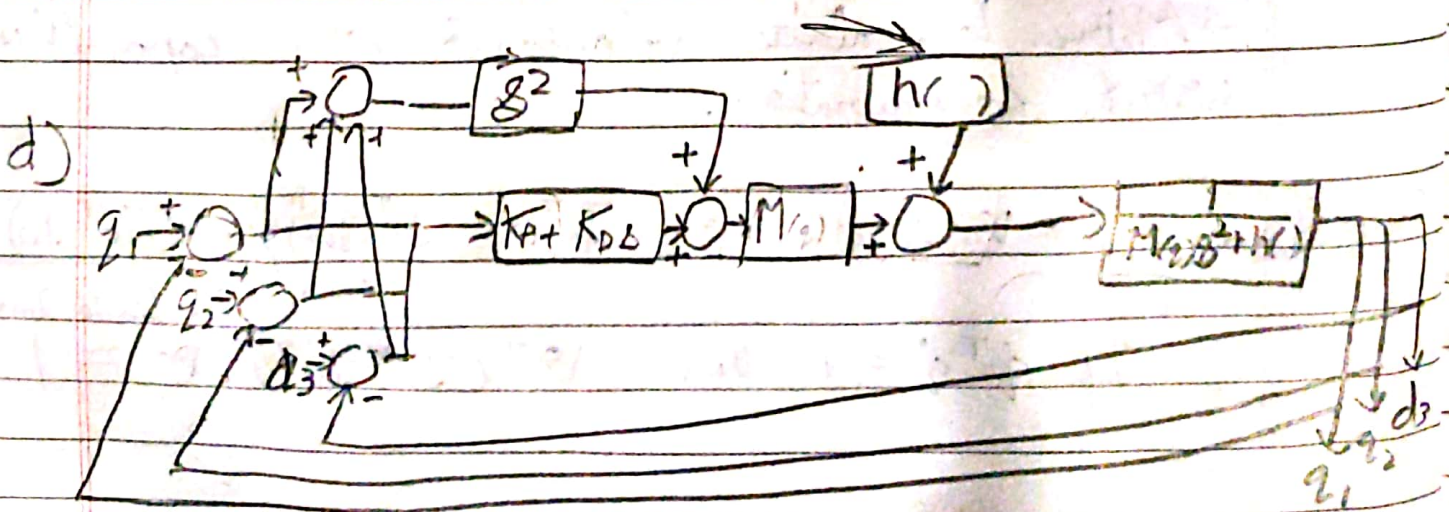
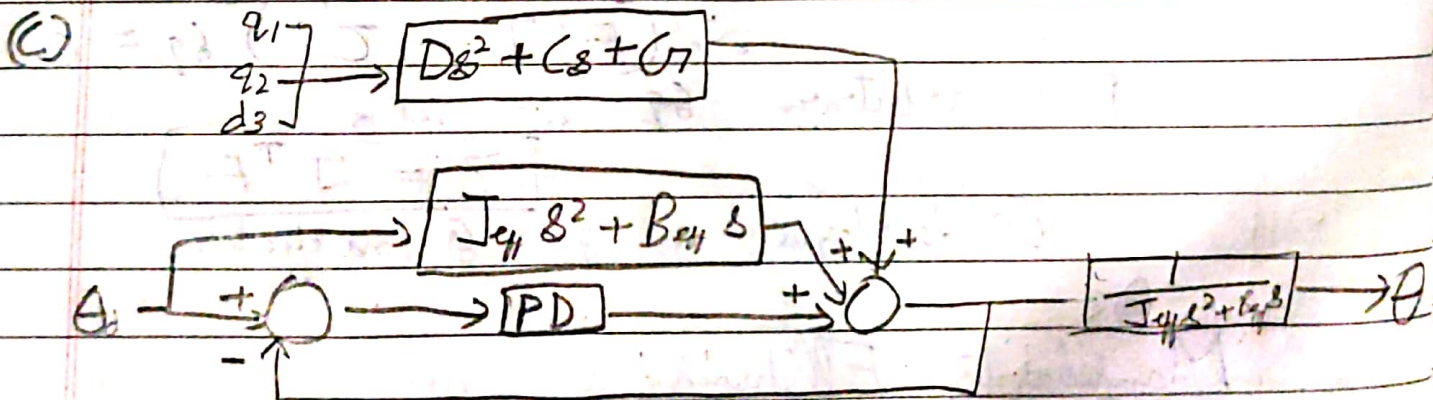
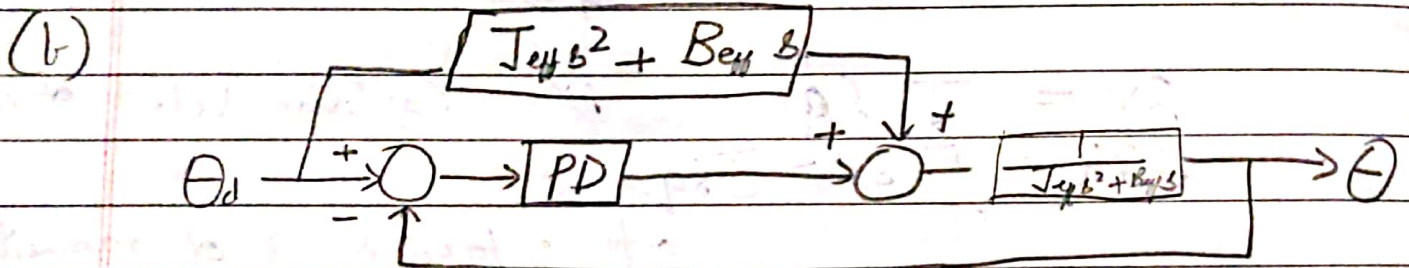
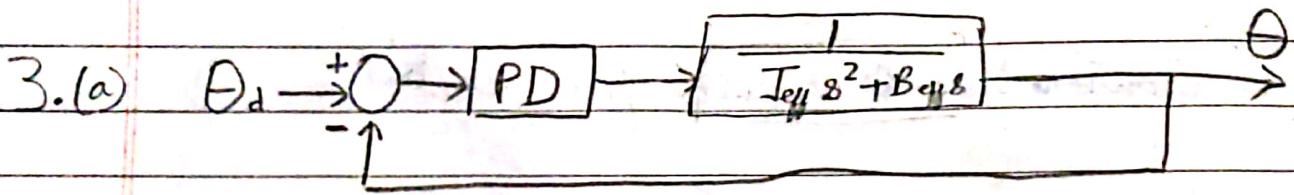
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PUSHAN PATEL

Code: DEV

DATE

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7.) PD alone:

There is some deviation in x & y direction from desired value. As gravity compensation is not there, so with low values of constants gravity pulls down the link ~~infinitely~~ infinitely till time permits.

With link length 20% of link attached to ~~the~~ 1st revolute joint. The deviation has increased as l-error in inverse kinematics.

There is a disturbance, min -2, max 2 Nm with standard deviation 0.1 Nm & mean 0. This led to a wavy deviation from required path.

With an impulse of 10 Nm from 4s to 5s we have a huge deviation which gets compensated by $t = 8.5s$ approximately

★ PD + Feedforward:

Better response along x & y . No gravity compensation so similar to PD alone.

There is a deviation in the response. It is better than the response of PD alone when there is link length error.

The result is much closer to desired than PD for the disturbance with standard deviation 0.1 Nm

In impulse action, gets on right track by $t = 7.5s$, faster than PD

* PD + FF + Disturbance Control:

Better performance than Feed forward. Gravity compensation, so control on z as well.

In link length error case, there constant deviation is similar to FF but z compensation is there.

Slightly better response than FF during continuous random disturbances

Impulse action back on track at $t = 7.5s$ around.

* Multi variable:

Performance better than PD. There is gravity compensation. There is no deviation along z .

Link length error causes similar effect in this case as well with better output on z -axis.

During continuous disturbance, the response is better than PD but not PD + FF + disturbance cancellation

Impulse action was too large for it to come back to path. Large deviations.

All these were implemented using same values of (K_p, K_d) . By adjusting these values according to the controller selected, we will get better results