INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
HYDERABAD

International Institute Of Information Technology

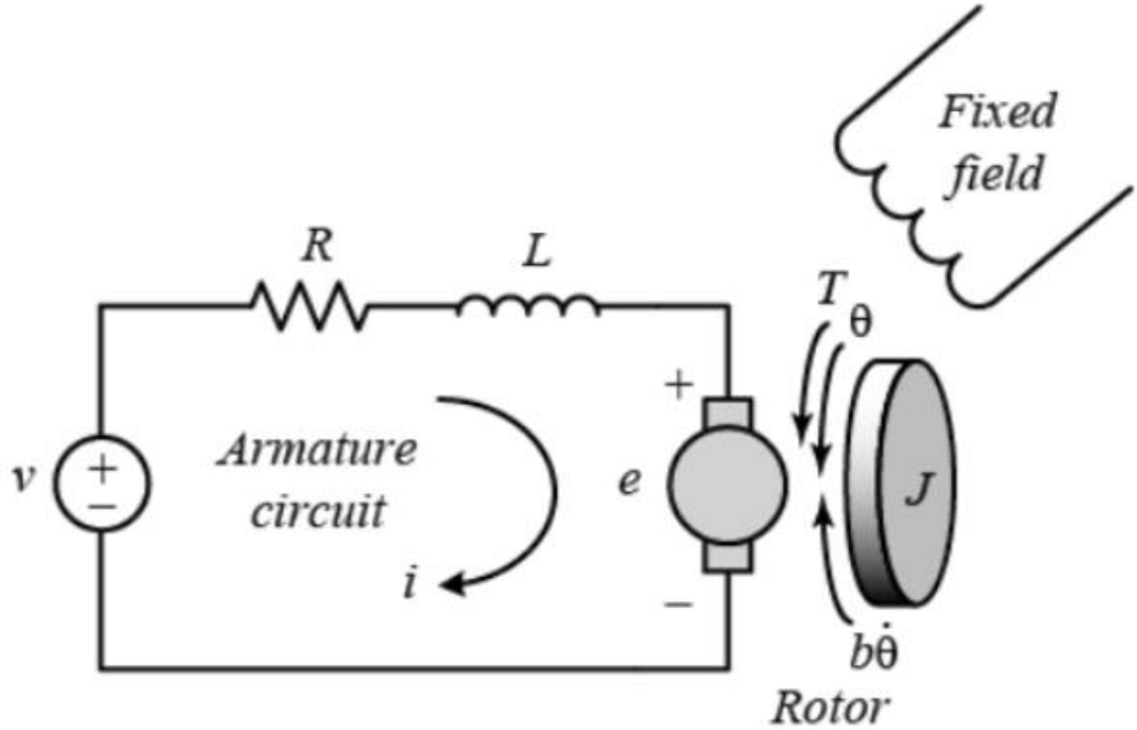
EC5.101.M20.NeSS-SS part

Submitted by:

Group A9

Sl.No	Name	Roll No.	Contributions
1.	Abhinav Siddharth	2020112007	Finding P gain, I gain, D gain.
2.	Smruti Biswal	2020112011	Finding transfer function, Cover-page and question writing.
3.	Sreenya Chitluri	2020102065	Building PID controller, Finding the step response

Problem Statement:



Figure

(J) - Moment of Inertia of the rotor = **0.01** $kg.m^2$

(b) - motor viscous friction constant = **0.1** $N.m.s$

(Ke) - electromotive force constant = **0.01** $V/rad/sec$

(Kt) - motor torque constant = **0.01** $N.m/Amp$

(R) - electric resistance = **1** Ω

(L) - electric inductance = **1** H

You have a DC motor as a system as shown in Figure above and it is supposed to run at a rotational speed ($\dot{\theta} = \frac{d\theta}{dt} = \omega$) of **0.1** rad/sec by accelerating from no rotation if the DC supply of **3** V is turned on. The back emf(e) developed in the system can be calculated as $e = K\omega$.

So, if we apply KVL in the circuit shown in Figure above , we get

$$L\frac{di}{dt} + Ri = V - K\omega$$

Once the motor speed reaches desired speed, possible changes in the motor speed should be less than **0.05** % of the desired speed. Once the motor turned on, before the steady state running condition any possible overshoot in speed should be less than **5**% as any higher speed can damage the system and the time to reach steady state should be less than **2**s. Design a PID controller for this purpose.