EE380 (Control Systems) Prelab work of Experiment 9 (modified version of Experiment 4)

Student Name	Roll No.	Bench No.

Q1 Using the values of K_m and τ_m that you determined from the OL step response in Experiment 1, determine the values of B and R_Σ by solving the given two equations.

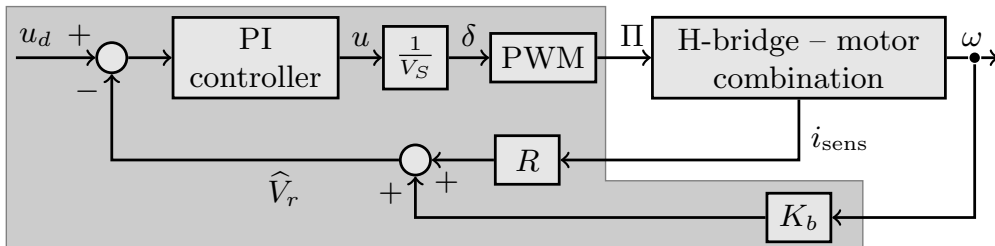$$K_m = \frac{K_T}{R_\Sigma B + K_T K_b} \qquad\qquad \tau_m = \frac{R_\Sigma J}{R_\Sigma B + K_T K_b}$$

Use the values of J, K_T, K_b from Table 1.1. Do not use the value of B calculated in Section 1.6 of the lab manual.

TIP: Write a small $(4-6$ lines$)$ GNU Octave code for doing this calculation as you may be required to do the calculation once again in the lab. $\boxed{\text{Bring the Octave code to the lab}}$

Q2 Write down the controller that you designed in Experiment 1.

Q3 Provided for this pre-lab assignment is a C-file `main-prog-exp9.c`. Examine this code and answer the following questions:

Q3.1 Write down the transfer function, with numerical values, of the PI controller used in the following block diagram. (Note: $R = R_\Sigma$ in the figures in this assignment)
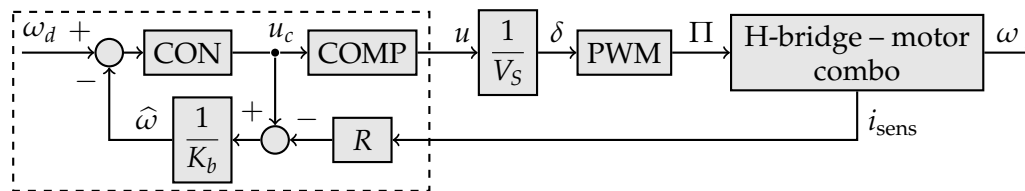
Q3.2 When you modify this C-file to use on your setup, which values in the block diagram will you modify in the C-file?

Q3.3 Values of which variables in the block diagram are sent to the PC by this C-file?

Q4 Provided for this pre-lab assignment is an m-file `readplot_exp9.m` and a .log file name `exp9saurav.log`. Run the m-file on the .log file and answer the following questions.

Q4.1 Write down the equation that you would use in the following block diagram as the compensator. (NOTE: You will obtain your own compensator in the lab)

Q4.2 Write the C-code implementation of the part of the block diagram that is in the dashed box.

Q4.3 Where will this C-code go — into `main-prog-exp9.c` or `main-prog.c`?

Q4.4 For how many seconds was `main-prog-exp9.c` run to generate the data in `exp9saurav.log`?