



Introduction to Robotics

CSE461

Assignment - 3

Fall 23

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Section: 09

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Here,

$$\text{my IP} = 21 \ 10 \ 12 \ 55$$

$$\text{sec} = 09$$

$$\text{So, } A=55, B=21, C=12, D=10, E=09$$

$$\text{Now, set speed, } Z = (A-B) = (55-21) = 34 \text{ rad/s}$$

after switching on, the motor reaches a speed of,

$$(0.1 \times 34) = 3.4 \text{ rad after } (E) = 09 \text{ sec.}$$

$$(0.5 \times 34) = 17 \text{ rad after } (E+E) = 18 \text{ sec.}$$

$$(0.9 \times 34) = 30.6 \text{ rad after } (D+E) = 19 \text{ sec.}$$

$$\text{also, after } (D+E+E) = 28 \text{ sec the value of first peak is,} \\ (Z+E) = 43 \text{ rad}$$

$$\text{again, 5\% of its final value after } (D+E+E+B) = 49 \text{ sec}$$

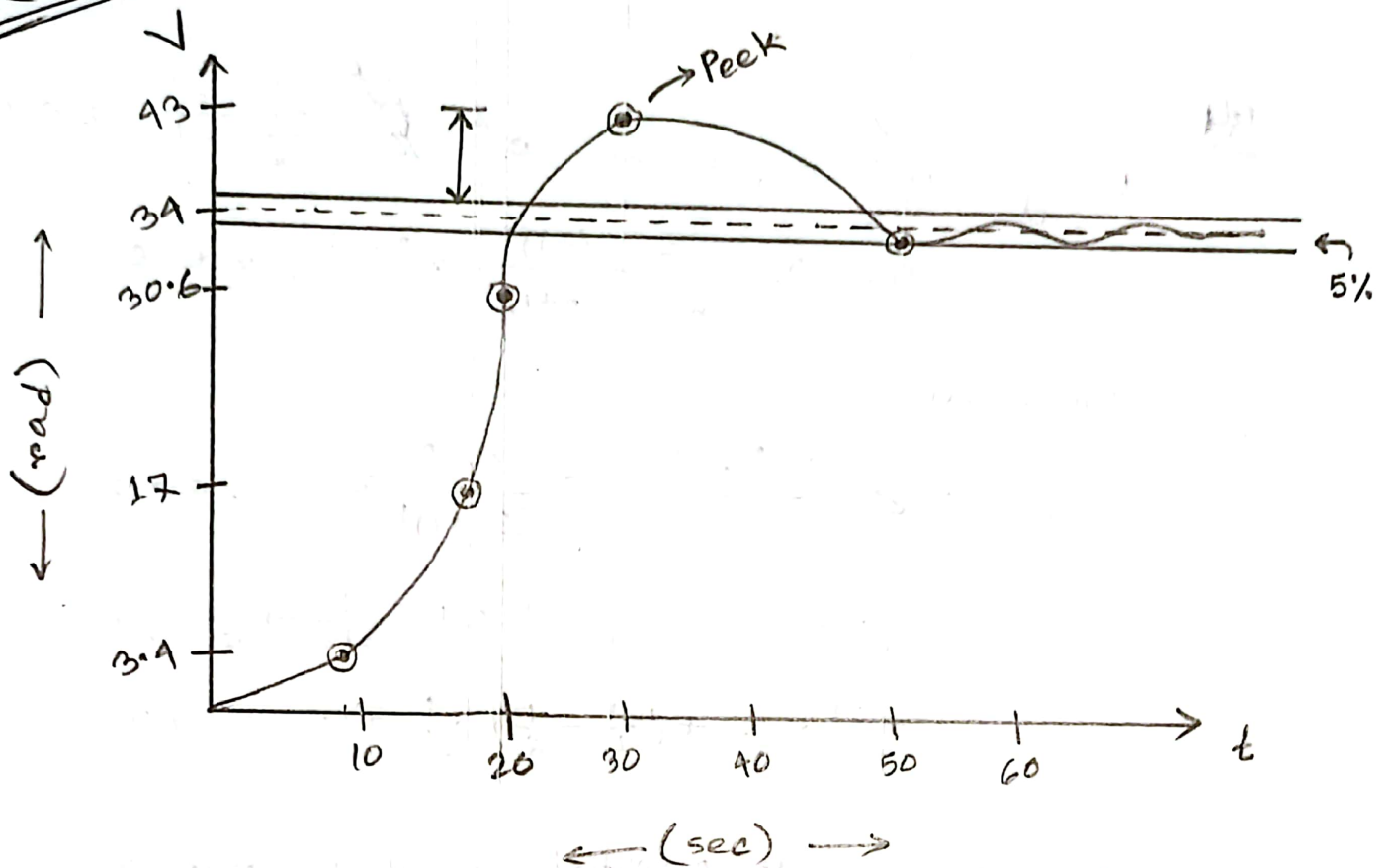
$$\therefore 5\% \text{ of final value} = 1.7 \text{ rad}$$

$$\therefore (34 \pm 1.7) \text{ rad}$$

$$\begin{array}{c} \swarrow \quad \searrow \\ (34+1.7) = 35.7 \quad (34-1.7) = 32.3 \end{array}$$

this is the initial calculation before answering the questions.

(Q-1): response time diagram,



(Q-2): overshoot time = $\frac{43-34}{34} \times 100\%$
 $= 26.47\%$. (Ans.)

Rise time = $\frac{19-9}{10} = 10 \text{ sec.}$ (Ans.)

Settling time = 49 sec. (Ans.)

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