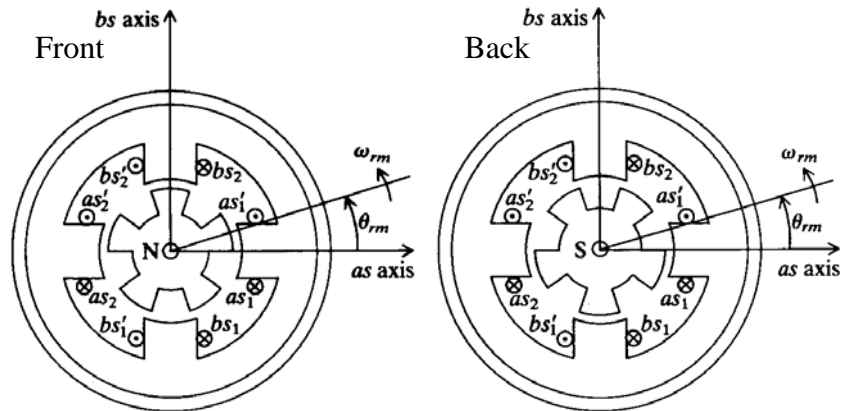


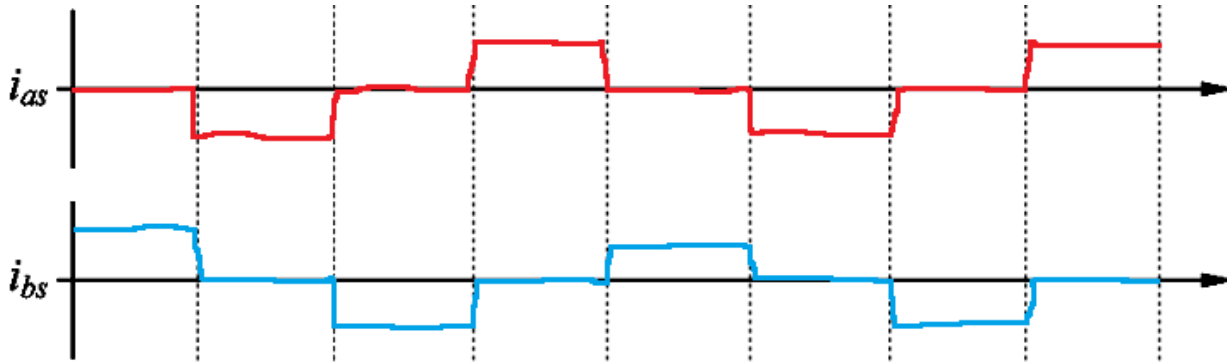
Name: _____ Student ID: _____

Close notes and books. Quizzes suspected of cheating and/or turned in late will not be marked. You have 10 minutes to answer the following questions:

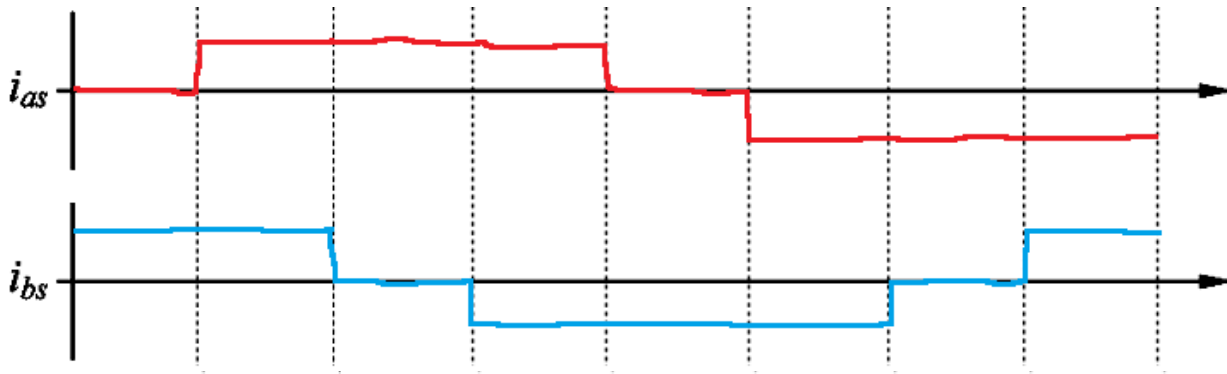
Q1: (80pts) Consider a 2-phase **PM Stepper Motor** shown here. The rotor initial position is as shown corresponds to the phase **bs** energized. Assume phase **bs** is energized positive first.



a) (40p) Sketch the sequence of currents i_{as} and i_{bs} to drive this motor at **full-step in CCW direction**



b) (40p) Sketch the sequence of currents i_{as} and i_{bs} to drive this motor at **half-step in CW directions**



Q2: (20pts) List some of the factors that limit the stepping rate (or speed) at which a given stepper motor can operate: We discussed this in class and you have observed that in Lab-3.

The stepping rate is limited by the rate at which the phase current can rise and fall, which is determined by the winding electrical time constant $\tau = \frac{L}{r}$ and the source voltage.