**ELEC 343: Quiz 3**  
**Solution**  
6 March, 2018

**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.