

EE 340 – Induction motor problem

Consider a 460 V, 60 Hz, 4-pole induction motor with the following circuit parameters: $R_1 = 0.25 \Omega$, $R_2 = 0.2 \Omega$, $X_1 = X_2 = 0.5 \Omega$, $X_m = 30 \Omega$. Its speed at full load is 1,740 rpm, and its rotational losses are 1,700 W. Calculate the following:

- 1) The motor starting current.
 - a) **120 A**
 - b) **186 A**
 - c) **246 A**
 - d) **293 A**

- 2) The motor starting torque.
 - a) **185 Nm**
 - b) **168 Nm**
 - c) **152 Nm**
 - d) **140 Nm**

- 3) The motor current when operating at full load.
 - a) **55 A**
 - b) **43 A**
 - c) **36 A**
 - d) **39 A**

- 4) The motor torque developed at full load.
 - a) **198 Nm**
 - b) **184 Nm**
 - c) **172 Nm**
 - d) **163 Nm**

- 5) The motor efficiency when operating at full load.
 - a) **85.5%**
 - b) **86.6%**
 - c) **88.2%**
 - d) **92.8%**

- 6) If the supply voltage to the motor is reduced by 10% from the specified rated voltage above, then the motor starting torque will be
 - a) **Reduced by 10%**
 - b) **Increased by 10%**
 - c) **Reduced by 19%**
 - d) **None of the above**