

Electric Machines & Drives

Homework Answers #2: Chapter 4, Chapter 5, Chapter 6

Due: 09/12/11

Chapter 4 of text book - Answers

4-9: a. 103V, b. 288W, c. 10.4 N*m

4-10: a. $E_{NL} = 138V$, b. Polarity reverses, c. Voltage increases, but not 10% due to saturation.

4-11: a. $5000A \cdot T$ b. $7800 A \cdot T$

4-16: 276.5V

4-17 : a. 12 brush sets, b. 150A

4-23 : a. 333A, b. current / brush set = 166.5A, current / coil = 83.25 A

4-24 : a. 480A

b. $P_{in} = 255319W$, $P_{loss} = 15319W$

c. I^2R loss 5520W

4-25 : 203.5 W/kg

4-26: $T = 1385 N \cdot m$

Chapter 5 of text book - Answers.

5-9 : a. 221V, b. 13.8kW, c. 13.26kW or 17.8 HP

5-10 : a. 1533A, b. 1.85 w

5-11 : a. $2975 A \cdot T$, b. 2400A

5-12 : 144V, 9.6V

5-14 : a. 0.48w, b. $P_{200} = 30kW$, $P_{50} = 1.9W$, $P_0 = 0$

5-15 = a. 0.96w, b. $P_{200} = 45kW$, $P_{50} = 8430W$, $P_0 = 0$, c. 135kW

5-21: $V = 11.23 ft^3/s = 674 ft^3/min$

Chapter 6 of text book - Answers.

6-9 : 131.4 kW, 547A

6-17 : a. $139^{\circ}C$ b. $108^{\circ}C$, c. $105^{\circ}C$, motor is hot

6-18 : 1 year (assuming motor at full load)

6-21 : New power is 26.2kW or 35HP

6-23 : life reduced 768 hours

6-27 : a. 915W, b. 224V

6-31 : 1948 ft/min 22 mi/hr

6-32: a. 0.00614 w, b. 0.092V, c. 1.29V, d. 38.7 W, e. 0.3 lbf or 1.33N, f. 0.528J, g. 26.4W, h. 5.8%