Course title: Electrical Machines

Course code: EE329

Sheet #5

1- A 3 phase induction motor is wounded for 4 poles and is supplied from 50Hz system. Calculate:
   a) Synchronous speed. b) Speed of the motor when the slip is 4%. c) Rotor current frequency when the motor runs at 600rpm.

2- The parameters of the equivalent circuit referred to stator for a 200V, 3-phase, 4 pole, 60Hz, star connected induction motor are:

   $R_1=0.2\Omega$ $X_1=0.5\Omega$ $R_c=400\Omega$

   $R_2=0.1\Omega$ $X_2=0.2\Omega$ $X_m=20\Omega$

   For a slip of 2.5%, calculate: a) No load (excitation) current. b) Input current.

3- The equivalent circuit parameters referred to stator of a 208V, 60Hz, 6 pole, star connected, three phase induction motor are:

   $R_1=0.21\Omega$ $X_1=0.6\Omega$ $R_c=210\Omega$

   $R_2=0.33\Omega$ $X_2=0.6\Omega$ $X_m=450\Omega$

   When the motor runs at a slip of 5% on full-load, using induction motor equivalent circuit and power flow diagram determine: a) Developed torque. b) Input power. c) Stator copper losses. d) Core losses. e) Power input to rotor.

4- A 25hp, 60Hz, 575V, 6 poles motor is operating at a slip of 0.03. The motor is star connected and the equivalent circuit parameters referred to stator are:

   $R_1=0.3723\Omega$ $X_1=1.434\Omega$ $R_c=354.6\Omega$

   $R_2=0.390\Omega$ $X_2=2.151\Omega$ $X_m=26.59\Omega$

   Determine: a) Input current. b) Output power. c) Output torque. d) Efficiency if the motor is operating at full load.

5- The shaft load on a 40hp, 60Hz, 460V, 4 poles induction motor is such as to cause the machine to operate at 1447 r/min. The motor is star connected and the equivalent circuit parameters referred to stator are:

   $R_1=0.1418\Omega$ $X_1=0.7273\Omega$ $R_c=212.73\Omega$

   $R_2=1.1\Omega$ $X_2=0.7284\Omega$ $X_m=21.27\Omega$

   Determine: a) Input current b) Output current c) Power input to rotor d) Efficiency, if the motor is operating at full load.

6- A 3 phase, 8 pole induction motor, star connected, rated at 880r/min, 30hp, 60Hz, 460V has the following parameters referred to stator:

   $R_1=0.1891\Omega$ $X_1=1.338\Omega$ $R_c=189.1\Omega$

   $R_2=0.191\Omega$ $X_2=0.5735\Omega$ $X_m=14.18\Omega$

   Determine: a) Input current. b) Efficiency if the motor is operating at 75% of its full load.