1. A 4-pole, 2.3 MW, 690 V, 50 Hz squirrel cage induction generator is used in a fixed-speed wind energy conversion system in Denmark (where the grid frequency is 50 Hz). Generator parameters are given below:

   R_1=0.001102 Ω X'_2=0.0204 Ω
   X_1=0.0204 Ω R'_2=0.001497 Ω
   R_C=∞ Ω
   X_m=0.6706 Ω

   At a given wind speed, the machine operates at the rated speed of 1512 rpm. Neglecting windage and friction losses, determine the following:
   a. The slip, and the rotor speed in mechanical rad/sec and in electrical rad/sec;
   b. The stator and rotor currents;
   c. The developed power and torque;
   d. The stator and rotor winding losses;
   e. The generator efficiency and power factor.