PART-C

(Numerical Questions)

3-Phase induction motor

1. A 4 pole, 3 phase induction motor when fed from a 50 Hz supply has a rotor frequency of 4 Hz. Calculate (i) slip (ii) rotor speed (iii) synchronous speed.

[ANS : 0.08, 1380rpm, 1500 rpm]

2. A 3-phase, 4 kW, 400 V, 50 hz induction motor is working at full load with an efficiency of 90% at a power factor of 0.8 lagging. Calculate (i) the input power (ii) the line current.

[ANS : 4.44 kW, 8.02 A]

3. A 3-phase 6 pole 50 Hz induction motor has a slip of 1 % at no load and 3 % at full load. Calculate i)Synchronous speed (ii) no load speed (iii) full load speed iv) frequency of rotor current at standstill (v) frequency rotor current at full load.

[ANS: 1000 rpm, 990 rpm, 970 rpm, 50 Hz, 1.5 Hz]

4. A 4 pole, 3 phase, 275kW, 440V, 50 Hz, induction motor is running with a slip of 4%. Find (i) synchronous speed (ii) rotor speed (iii) frequency of the rotor induced emf.

[ANS: 1500 rpm, 1440 rpm, 2 Hz]

5. A 4 pole, 3 phase, 275kW, 440V, 50 Hz, induction motor has a speed of 1460 rpm on full load. Calculate the slip and speed of the rotating magnetic field.

[ANS: 0.026, 1500 rpm]

6. A 6-pole, 50 Hz induction motor has no-load speed 980 rpm and full-load speed 960 rpm. Calculate:
   i) Synchronous speed
   ii) No-load slip
   iii) full-load slip
   iv) Frequency of rotor at full-load

[ANS: 1000 rpm, 2%, 4%, 2 Hz]

7. In case of 8 pole induction motor, the supply frequency was 50 Hz. And shaft speed 735 rpm. What are the magnitudes of the following
   i) synchronous speed
   ii) rotor speed
   iii) slip

[ANS: 750 rpm, 735 rpm, 2 Hz]

8. The no-load speed of an induction motor is 1480 rpm. When it is connected across a voltage source of frequency 50 cycles/sec, the motor speed is 1200 rpm at full load.

   Determine
   i) The number of poles
   ii) Slip at full load
   iii) Rotor frequency at full load

[ANS: 4, 20%, 10 Hz]