# CHAPTER 15

## Additional Problems

### Solved Problems

A three-phase, 440 V, 1000 rpm slip ring induction motor is operating with 4 % slip. Stator current is 30 A. Determine the stator current if the speed of the motor is reduced to 500 rpm using stator voltage control method.

**Sol.** Here $$T \alpha \frac{I_1 \cdot r_2}{S_1} \alpha \frac{I_2^2 \cdot r_2}{S_2}$$

or, $$\frac{I_1^2}{I_2^2} = \frac{S_1}{S_2}$$

*i.e.* $$\frac{I_1}{I_2} = \left(\frac{S_1}{S_2}\right)^{1/2}$$

Here, $$S_1 = 0.04, S_2 = \frac{1000 - 500}{1000} \times 100$$

$$= 0.5.$$

Since, $$I_1 = 30 \text{ A}.$$

$$\frac{30}{I_2} = \left(\frac{0.04}{0.5}\right)^{1/2} = 0.28.$$

$\therefore$ $$I_2 \frac{30}{0.28} = 106 \text{ A}.$$

Thus, current at speed of 500 rpm is 106 A.

**15.2** An inverter feeds a 4-pole 3-phase squirrel cage induction motor rated for 400 V, 50 Hz supply. Determine the approximate output required for the inverter for the motor speeds of (i) 900 rpm (ii) 1800 rpm

**Sol.** $$F = \frac{\text{N.P}}{120}.$$

(i) For 900 rpm, $$F = \frac{4 \times 900}{120} = 30 \text{ Hz}$$

$\therefore$ Output of inverter, $$E_{dc} = \frac{400}{50} \times 30$$

$$= 240 \text{ V}.$$

(ii) For 1800 rpm,

$$F = \frac{4 \times 1800}{120} = 60 \text{ Hz.}$$

$$\therefore \quad E_{dc} = \frac{400}{50} \times 60 = 480 \text{ Volts.}$$