Roll No.: [22b3936] Marks: 10.0

Question 1.

A 400 V, 50 Hz, 20 A, 1480 rpm delta connected squirrel cage induction motor is fed from a 400 V, 50 Hz ac source. The parameters of the induction machine are as follows:

$R_1 \cong$ 0.0 Ω, r_2' = 0.4 Ω, $X_1 \cong$ 0.0 Ω, $x_2' \cong$ 0.0 Ω, X_m can be considered very large compared to other impedances.

The machine is negotiating a load torque whose speed versus torque characteristic is given as $\omega = 200 - 10T_L$ where ω is expressed in rad/sec and T_L is expressed in Nm. Determine the equilibrium speed at which the motor load system will operate. Determine and comment on the stability of the equilibrium point. [7+3]

Rubrics: No rubrics available.

Click to load preview

Click to load preview

CHAT

Roll No.: [22b3936] Marks: 10.0

Question 2.

A 400 V, 3 phase, 50 Hz, 6 pole, 945 rpm delta connected induction motor has following parameters:

$$r_1 \cong 0.0\ \Omega,\ r_2' = 2.0\ \Omega,$$
$$x_1 \cong 0.0\ \Omega,\ x_2' = 4.0\ \Omega.$$

Neglect the effect of X_m and rotational losses.

(i) Determine the speed at which the motor will run its rated load torque when the stator terminals are fed with 380 V (L-L). The load torque is independent of speed. Also determine the line current of the motor.

(ii) The above machine is now operated with V/f control to drive the same load at the same speed as obtained in (i). Determine the applied voltage and frequency for the motor. Also determine the line current of the motor.

Rubrics: No rubrics available.

Click to load preview | Click to load preview | Click to load preview

CHAT

Roll No.: [22b3936] Marks: 10.0

Question 3.

A 400 V, three phase, 50 Hz, 6 pole, 950 rpm delta connected induction motor has the following parameters:
$r_1 \cong 0.0\ \Omega, r_2' = 0.3\ \Omega, x_1 \cong 0.0\ \Omega, x_2' = 1.0\Omega$.
Neglect the effect of X_m and rotational losses. Calculate the motor speed while it is developing full load torque and being fed with 160 V (L-L) and 20 Hz.

Rubrics: No rubrics available.

Click to load preview

Click to load preview

CHAT