Questions from the same exercise can be combined together to increase difficulty.

Statement questions can be mixed together (or maybe changed from false to true or opposite) as soon as there is only one false statement per question!

mine

Which one of the following statements about synchronous motors is NOT true?

a) Synchronous motors are identical in construction to salient pole ac generators.

b) The stator winding of a synchronous motor is identical to the stator winding of a 3-phase induction motor.

c) The salient poles of a synchronous motor are excited by ac current.

d) A damper winding serves to start the synchronous motor.

mine

Which one of the following statements about synchronous motors is NOT true?

a) Modern synchronous motors use brushless rotor excitation.

b) Rotor and stator of a synchronous motor can NEVER have the same number of poles.

c) A synchronous motor operating at 60Hz, running at 200rpm has 36 poles.

d) Synchronous motors can use a small 3phase generator to excite their rotor.

mine

Which one of the following statements about synchronous motors is NOT true?

a) Synchronous motors can start by themselves.

b) Synchronous motors are usually equipped with a squirrel cage winding.

c) The dc excitation is suppressed during the start up period.

d) Very large synchronous motors are usually brought up to speed by pony motors.

mine

Which one of the following statements about synchronous motors is NOT true?

a) To reverse the direction of rotation we simply interchange any two lines connected to the stator.

b) The dc excitation starts as soon as the motor is running close to the synchronous speed.

c) The goal in the start up period is the N poles of the stator to face the N poles of the rotor (and respectively the S poles of the stator to face the S poles of the rotor) so that they repel each other.

d) Once the synchronous motor rotates in synchronous speed no voltage is induced in the squirrel cage winding.

mine

Which one of the following statements about synchronous motors is NOT true?

a) During no-load, the axes of the pole of the stator and rotor coincide.

b) When a synchronous motor is mechanically loaded the rotor pole axes are moving slightly forward than the stator poles.

c) The mechanical angle α increases progressively as we increase the load.

d) As the angle α increases the torque developed by the motor is greater.

mine

Which one of the following statements about synchronous motors is NOT true?

a) The mechanical angle α can increase up to any value in normal operation.

b) As the mechanical angle α increases, the stator current increases.

c) When the mechanical load torque increases beyond the pull out torque the motor is stopped.

d) The speed of a synchronous motor is constant and independent of the load.

mine

Which one of the following statements about synchronous motors is NOT true?

a) As the power rating of synchronous motor increases, so does their efficiency.

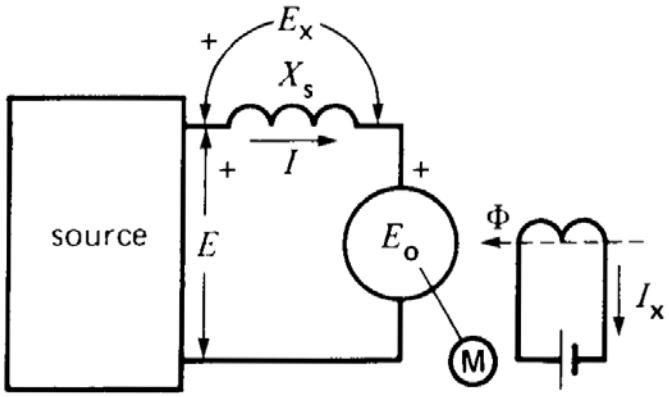
b) Synchronous motors only generate reactive power.

c) Produced reactive power of a synchronous motor increases with an increase of the excitation of the rotor.

d) Synchronous motors can have a power factor of unity.

Example 17-2a (Ex)

Illustrated the figure below, a 500hp, 720rpm synchronous motor connected to a 3980V, 3-phase line generates an excitation voltage E_0 of 1790V (line-to-neutral) when the dc exciting current is 25A. The synchronous reactance is 22Ω and the torque angle between E_0 and E is 30^o. (Voltage reference is the voltage E)



What is the value of E_x?

a) 2190V < 0^o

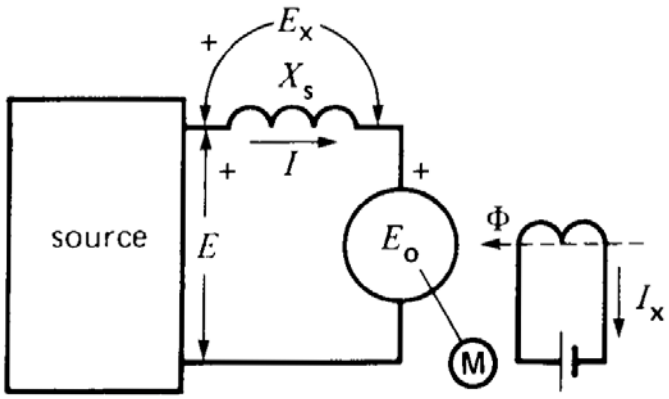
b) 510V < 0^o

c) 510V < 50^o

d) 1168V < 50^o.

Example 17-2a (line current)

Illustrated the figure below, a 500hp, 720rpm synchronous motor connected to a 3980V, 3-phase line generates an excitation voltage E_0 of 1790V (line-to-neutral) when the dc exciting current is 25A. The synchronous reactance is 22Ω and the torque angle between E_0 and E is 30^o. (Voltage reference is the voltage E)



What is the value the ac line current?

a) 53A < -40^o.

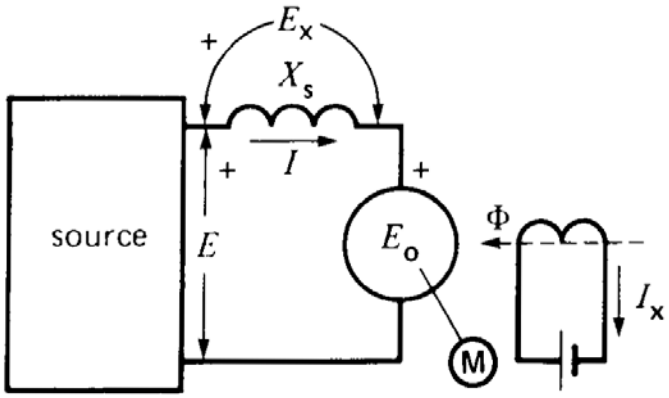
b) 99,5A < 0^o.

c) 99,5A < -40^o.

d) 53A < 0^o.

Example 17-2a (power factor)

Illustrated the figure below, a 500hp, 720rpm synchronous motor connected to a 3980V, 3-phase line generates an excitation voltage E_0 of 1790V (line-to-neutral) when the dc exciting current is 25A. The synchronous reactance is 22Ω and the torque angle between E_0 and E is 30^o. (Voltage reference is the voltage E)



What is the power factor?

a) 0,86.

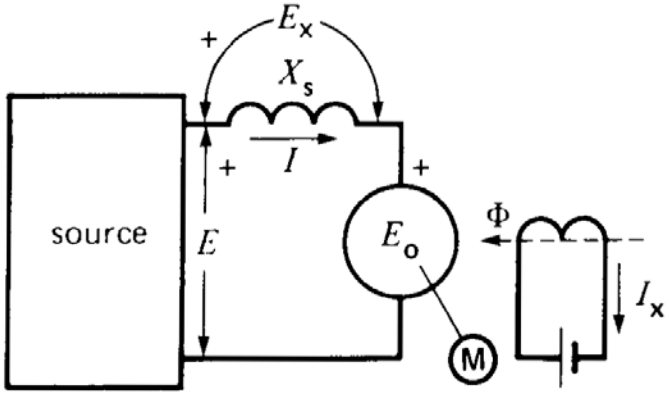
b) 1.

c) 0,64.

d) 0,76.

Example 17-2a (approximate horsepower)

Illustrated the figure below, a 500hp, 720rpm synchronous motor connected to a 3980V, 3-phase line generates an excitation voltage E_0 of 1790V (line-to-neutral) when the dc exciting current is 25A. The synchronous reactance is 22Ω and the torque angle between E_0 and E is 30^o. (Voltage reference is the voltage E)



What is the horsepower at the output during this operation, neglecting the losses (iron, copper, etc)?

a) 500hp.

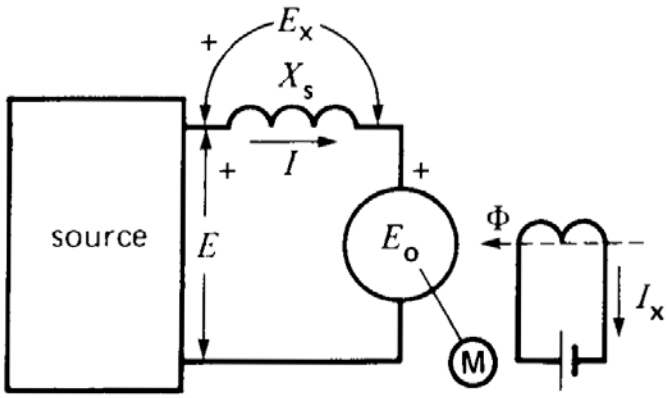
b) 375hp.

c) 490hp.

d) 125hp.

Example 17-2a (approximate torque)

Illustrated the figure below, a 500hp, 720rpm synchronous motor connected to a 3980V, 3-phase line generates an excitation voltage E_0 of 1790V (line-to-neutral) when the dc exciting current is 25A. The synchronous reactance is 22Ω per phase and the torque angle between E_0 and E is 30^o. (Voltage reference is the voltage E)



What is the torque at the output during this operation, neglecting the losses (iron, copper, etc)?

a) 3715 Nm.

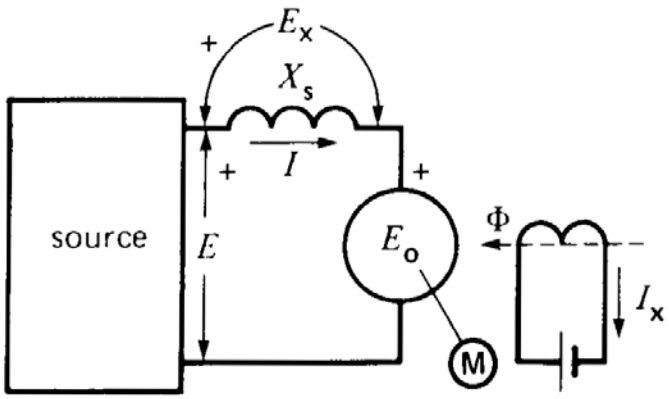
b) 389 Nm.

c) 4851 Nm.

d) 1239 Nm.

Example 17-3

A 150kW, 120rpm, 460V, 3-phase synchronous motor has a synchronous reactance of 0.8Ω per phase. The excitation voltage E_0 is fixed at 300V per phase. The motor is shown below.



What is the pull out torque of the motor?

a) 1373 Nm.

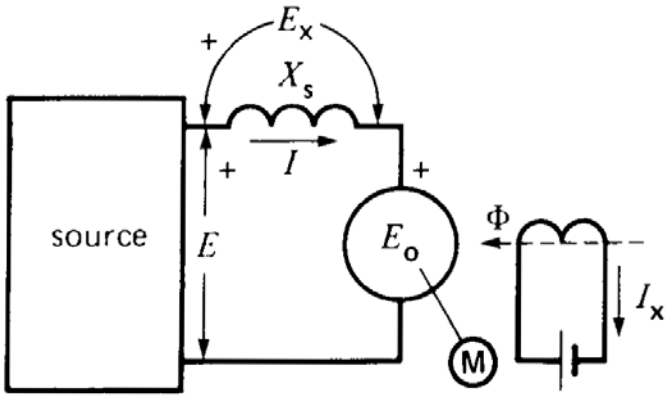
b) 792,6 Nm.

c) 143.75 Nm.

d) 83 Nm.

Example 17-4 (electrical angle)

A 3-phase, 6000kW, 4kV, 180rpm, 60Hz synchronous motor has a synchronous reactance of 1.2Ω. At full-load the rotor poles are displaced by a mechanical angle of 1^o from their no-load position. The line-to-neutral excitation E_0=2.4kV. The motor is shown below.



What is the electrical torque angle?

a) 1^o.

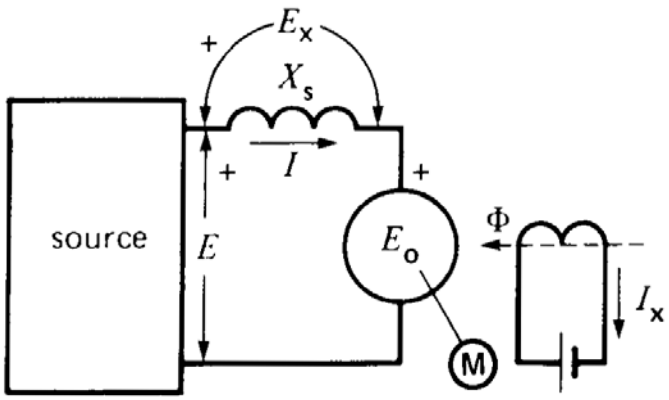
b) 0.5^o.

c) 20^o.

d) 30^o.

Example 17-4 (mechanical power)

A 3-phase, 6000kW, 4kV, 180rpm, 60Hz synchronous motor has a synchronous reactance of 1.2Ω. At full-load the rotor poles are displaced by a mechanical angle of 1^{o} from their no-load position. The line-to-neutral excitation E_0=2.4kV. The motor is shown below.



What is the mechanical power developed?

a) 418kW.

b) 1579kW.

c) 2309kW.

d) 4619kW.