Most questions are of increased difficulty

14.10

A standard squirrel-cage induction motor rated at 50hp, 440V, 60Hz, 1150r/min is connected to a 208V, 3-phase line. By how much are the breakdown torque and locked-rotor torque altered?

a) 47%.

b) 22%.

c) 212%.

d) 448%.

14.11 (1)

A 3-phase squirrel-cage induction motor having a rated voltage of 575V, is connected to a 520V line. What is the change in the locked-rotor current?

a) 82%.

b) 111%.

c) 90%.

d) 122%.

14.11 (2)

A 3-phase squirrel-cage induction motor having a rated voltage of 575V, is connected to a 520V line. What is the change in the locked-rotor torque?

a) 82%.

b) 111%.

c) 90%.

d) 122%.

14.14 (1)

A 300hp, 2300V, 3-phase, 60Hz squirrel-cage induction motor turns at a full-load speed of 590r/min. What is the approximate value of the rotor I^2R losses?

a) 3.8kW.

b) 223kW.

c) 227kW.

d) 300kW.

14.14 (2)

A 300hp, 2300V, 3-phase, 60Hz squirrel-cage induction motor turns at a full-load speed of 590r/min. The line voltage drops to 1944V. What is the new speed, knowing that the load torque remains the same?

a) 589r/min.

b) 593r/min.

c) 586r/min.

d) 591r/min.

14.14 (3)

A 300hp, 2300V, 3-phase, 60Hz squirrel-cage induction motor turns at a full-load speed of 590r/min. The line voltage drops to 1944V. What is the new power output in hp?

a) 299.5hp.

b) 301.5hp.

c) 298hp.

d) 300.5hp.

14.14 (1)

A 300hp, 2300V, 3-phase, 60Hz squirrel-cage induction motor turns at a full-load speed of 590r/min. The line voltage drops to 1944V. What is the new approximate value of the rotor I^2R losses?
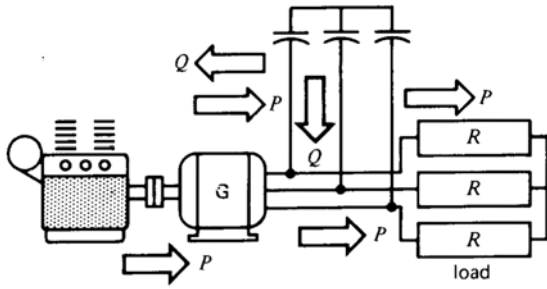
a) 5.3kW.

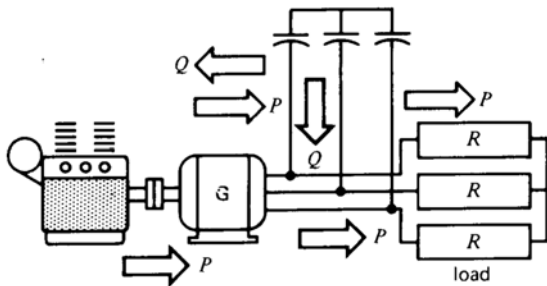b) 223kW.

c) 227kW.

d) 300kW.

14.15 (1)

We wish to make an asynchronous generator using a standard squirrel-cage induction motor rated at 40hp, 208V, 870r/min, 60Hz as in the figure below. The generator is driven at 2100r/min by a gasoline engine, and the load consists of three 5Ω resistors connected in wye. The generator voltage builds up when three 100µF capacitors are connected in wye across the terminals. If the line voltage is 520V, what is the approximate frequency generated?

a) 17.5Hz.

b) 140Hz.

c) 50Hz.

d) 60Hz.

14.15 (2)

We wish to make an asynchronous generator using a standard squirrel-cage induction motor rated at 40hp, 208V, 870r/min, 60Hz as in the figure below. The generator is driven at 2100r/min by a gasoline engine, and the load consists of three 5Ω resistors connected in wye. The generator voltage builds up when three 100μF capacitors are connected in wye across the terminals. If the line voltage is 520V, what is the active power supplied to the load?

a) 54kW.

b) 10kW.

c) 33kW.

d) 45kW.

14.15 (3) DIFFICULT

We wish to make an asynchronous generator using a standard squirrel-cage induction motor rated at 40hp, 208V, 870r/min, 60Hz as in the figure below. The generator is driven at 2100r/min by a gasoline engine, and the load consists of three 5Ω resistors connected in wye. The generator voltage builds up when three 100μF capacitors are connected in wye across the terminals. If the line voltage is 520V, what is the reactive power supplied to the load?
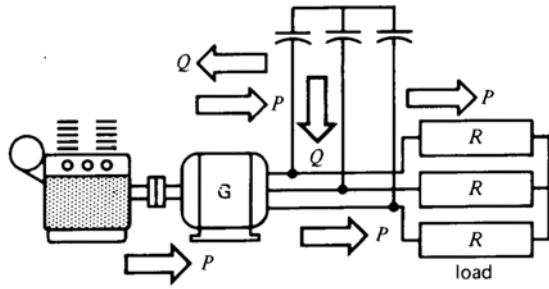
a) 10.1kVAr.

b) 23.8kVAr.

c) 49.2kVAr.

d) 50kVAr.

14.16 (1)

A 30000hp, 13.2kV, 3-phase, 60Hz air-to-water cooled induction motor drives a turbo compressor in a large oxygen-manufacturing plant. The motor runs at an exact full-load speed of 1792.8r/min. The motor has an efficiency of 98.1% and a power factor of 0.90. What is the full-load current?

a) 1109A.

b) 1921A.

c) 524A.

d) 762A.

14.16 (2)

A 30000hp, 13.2kV, 3-phase, 60Hz air-to-water cooled induction motor drives a turbo compressor in a large oxygen-manufacturing plant. The motor runs at an exact full-load speed of 1792.8r/min. The motor has an efficiency of 98.1% and a power factor of 0.90. What are the total losses at full load?

a) 101kW.

b) 56kW.

c) 434kW.

d) 790kW.

14.16 (3) DIFFICULT

A 30000hp, 13.2kV, 3-phase, 60Hz air-to-water cooled induction motor drives a turbo compressor in a large oxygen-manufacturing plant. The motor runs at an exact full-load speed of 1792.8r/min. The motor has an efficiency of 98.1% and a power factor of 0.90. What are the exact rotor I^2R losses if the windage and friction losses amount to 62kW?

a) 773kW.

b) 591kW.

c) 11kW.

d) 90.2kW.