



Voorwoord

Bij dit tentamen mag gebruik gemaakt worden van een handgeschreven formuleblad met 10 formules. Geen schema's.

Maak elke opgave op een aparte bladzijde. Geef niet alleen de eindantwoorden maar ook de tussenantwoorden. Onderstreep de antwoorden.

Degenen die eerder dan dit jaar ingeschreven hebben gestaan voor dit vak s.v.p. vermelden "Jaar nnnn ingeschreven Bb" bovenaan op het eerste blad van de uitwerkingen. Dit in verband met de Bb huiswerkopgaven.

Succes!

Problem 1 (10 points)

A inductive load is connected to a power supply of 230V 50Hz and draws 4A current. The power factor is 75%.

Calculate:

- The reactive power absorbed by the load. (2 points)
- The active power absorbed by the motor. (2 points)
- The power factor must be corrected to 1 by connecting a capacitor parallel to the load. Calculate the value of the capacitor. (4 points)
- Draw the fasordiagram of the voltage, the current through the load, the reactive current and the current through the capacitor. (2 points)

Problem 2 (10 points)

A 36 MVA 20.8 kV, 3 phase alternator has a synchronous reactance of 9Ω and a nominal current of 1 kA. The no-load saturation curve giving the relationship between E_o and I_x is given in Fig.16.13b. If the excitation is adjusted so that the terminal voltage remains fixed at 21kV, calculate: a. The exciting current required (1 point) and draw the phasor diagram for the following conditions:

- No load.(3 points)
- Resistive load of 36MW. (3 points)
- Capacitive load of 12Mvar (3 points)

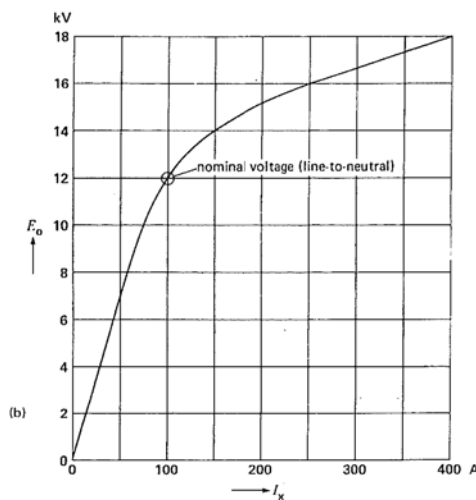
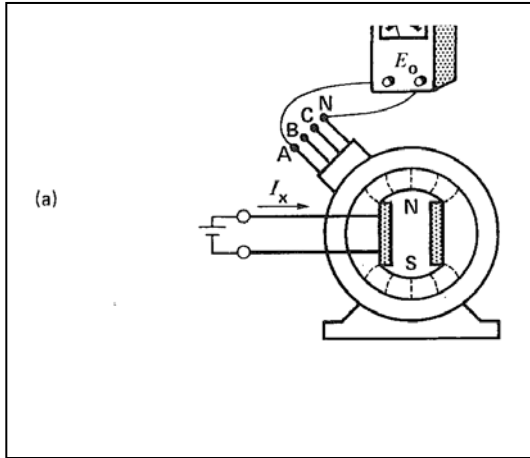


Figure 16.13

- Generator operating at no-load.
- No-load saturation curve of a 36 MVA, 21 kV, 3-phase generator.

Problem 3 (10 points)

The following data is given on a buck/boost converter (Fig. 21.65);
 $E_H=100V$ $E_O=30V$ $R=2\Omega$ $L=10mH$ switching frequency =20kHz with a duty cycle D of 0.2 for $S1$.

Determine the following:

- The value and direction of the DC current I_L . (5 points)
- The peak to peak ripple superposed on the DC current. (5 points)

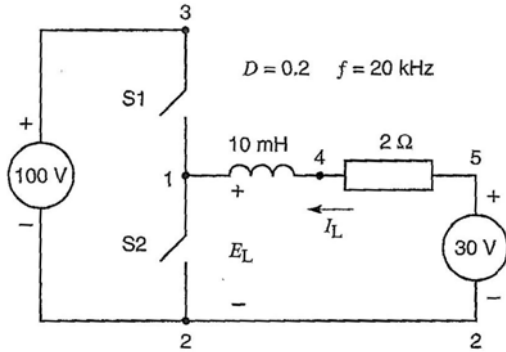


Figure 21.65

Questions (10 points)

- (1 point)

Draw the schematic of a two quadrant and a four quadrant electronic DC-DC converter.

- (3 points)

Draw the wave shapes E_{AY} and E_{AB} of the DC to AC sine wave converter from figure 21.88

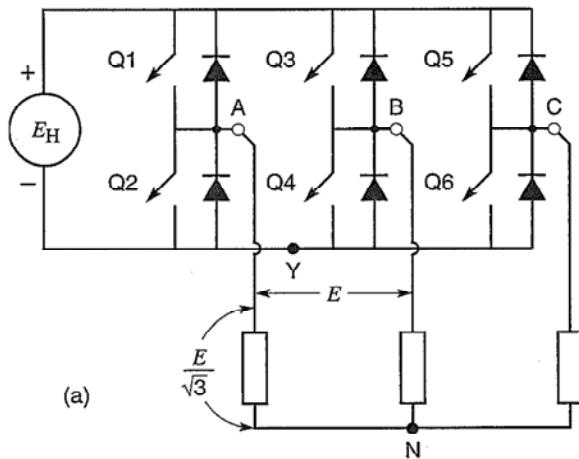


figure 21.88

3. (3 points) Simple battery charger.

Draw the voltage between point 2 and 1, 3 and 1 and 4 and 1 and current I of the circuit from fig. 21.11

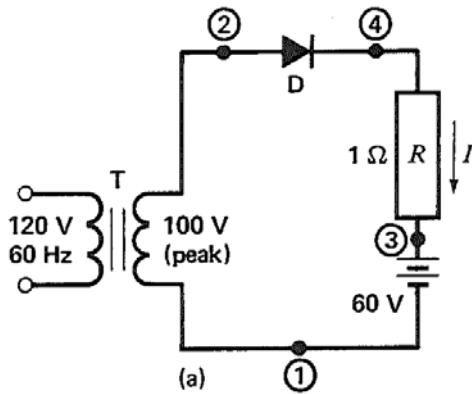


Figure 21.11

a. Simple battery charger circuit.

4. (2 points)

Draw the fador diagram of a synchronous motor with torque angle 40° .

5. (1 point)

What is the relation between reactive power Q , active power P and apparent power S ?