Voorblad

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 single phase motor draws a current of 5A from a 120V, 60 Hz line.
The power factor of the motor is 65%.
A 60 μF capacitor is placed across the motor terminals.
Calculate:
a. The reactive power generated by the capacititor. *(2 points)*
b. The active power absorbed by the motor. *(2 points)*
c. The reactive power absorbed from the line. *(2 points)*
d. The line current. *(2 points)*
e. Draw the power triangle of the motor and capacitor connected to the line. *(2 points)*

Problem 2 (10 points)

A 300 hp, 2300V, 60 Hz, 3 phase squirrel-cage induction motor turns at a full load speed of 590rpm. The synchronous speed is 600 rpm.
a. Calculate the approximate value of the rotor I^2R losses. *(4 points)*
If the line voltage then drops to 1944 V, calculate the following:
b. The new speed, knowing that the load torque remains the same. *(4 points)*
c. calculate the number of poles of the motor. *(2 points)*

Problem 3 (10 points)

A four quadrant converter such as illustrated in fig. 21.70 is powered by a 600 V DC source and the switching frequency is 25kHz. The duty cycle is set at a value of 0.35. Calculate:

a. The average voltage between terminals A and 2. *(2 points)*
b. Is terminal A positive with respect to terminal 2? *(1 point)*
c. The average DC voltage between terminals B and 2. *(2 points)*
d. Is terminal B positive with respect to terminal 2? *(1 point)*
e. The average DC voltage between terminals A and B. *(2 points)*
f. What is the polarity of A with respect to B? *(2 points)*

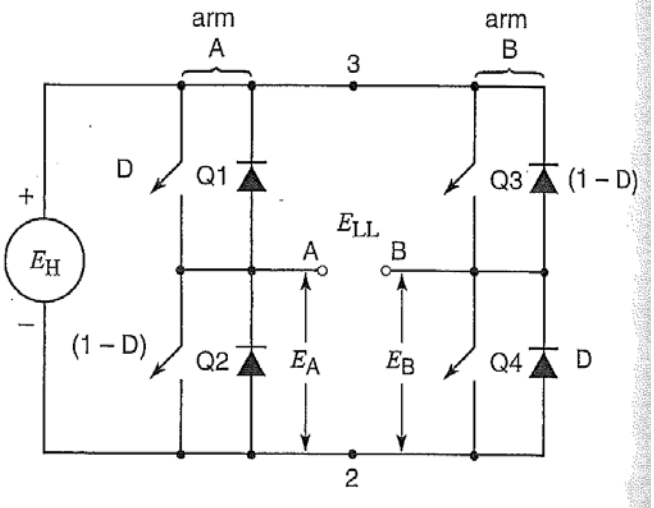

Figure 21.70
Four-quadrant dc-to-dc converter.

fig 21.70

Questions (10 points)

1. *(1 point)*
State the basic properties of a diode.

2. *(3 points)*
Draw the complete torque speed curve of a 3 phase induction machine and mark the brake + motor and generator region.

3. *(3 points)*
Cycloconverter.
Draw the schematic of a cycloconverter and the typical output of a cycloconverter.

4. *(2points)*
Draw the fasor diagram of a synchronous motor with torque angle 30^o

5. *(1 point)*
What is the definition of "power factor" PF?