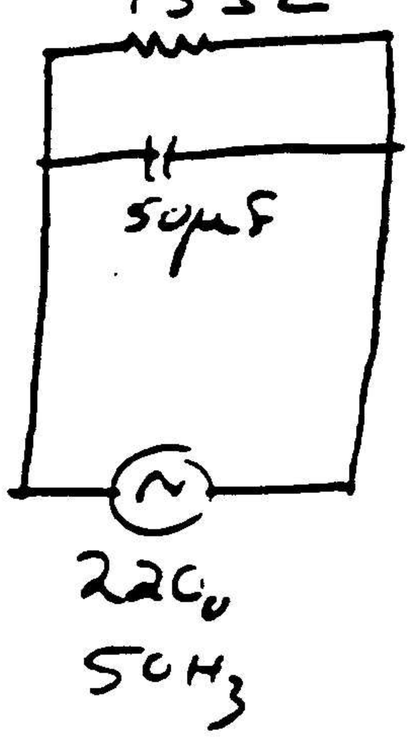
POSSIBLE ANSWERS:
TECHNIKA ELECTRICAL SG

QUESTION 1
ELECTRICAL CURRENT THEORY

1.1.1 $X_L = 2\pi$ fl – The reaction of an inductor to the change in voltage and current in an AC Circuit due toe Lenzi Law. measured in ohm (3)

1.1.2 $X_L = \frac{1}{a\pi fl}$. The reaction of a capacitor to the change in voltage and current in an AC circuit due to the characteristic energizing of a capacitor through AC? (3)

1.1.3 Die skynbare w/s weerstand . Impedance is the total reaction of passive components RLC in a AC Circuit, opposing the flow of current through the circuit, measured in OHM. $Z = \sqrt{R^2 + (X_L = X_L)^2}$. (3)

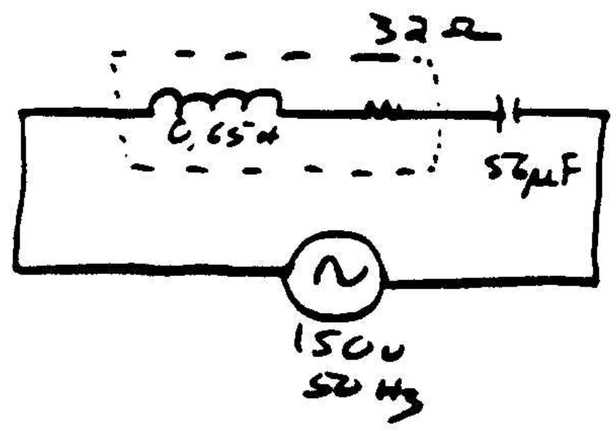


1.2.1 $I_R = \frac{U_R}{R} = \frac{220c}{75} = \underline{2.933\ A}$ (3)

1.2.2 next page

1.3

1.3.1 $X_L = 2\pi$ fl
$= 2\pi \times 50 \times 0{,}65$
$= \underline{204{,}203\ \Omega}$



(3)

1.3.2 $X_C = \frac{1}{2\pi fc}$

$= \frac{1}{2\pi \times 50 \times (56 \times 10^{-6})}$

$= \frac{1}{0,0176}$

$= \underline{56,841\Omega} \rightarrow$ (3)

1.3.3 $Z = \sqrt{R^2 + (X_L \simeq X_C)^2}$

$= \sqrt{32^2 + (204,203 \simeq 56,841)^2}$

$= \sqrt{22\,739,559}$

$= \underline{150,796\Omega} \rightarrow$ (3)

1.3.4 $I = \frac{V}{Z} = \frac{150}{150,796} = 0,995A \rightarrow$

$P = VI \cos ø$

$= 150 \times 0,995 \times 0,212$

$= \underline{31,641 \text{ Watt}} \rightarrow$

of

$\cos ø = \frac{R}{Z}$

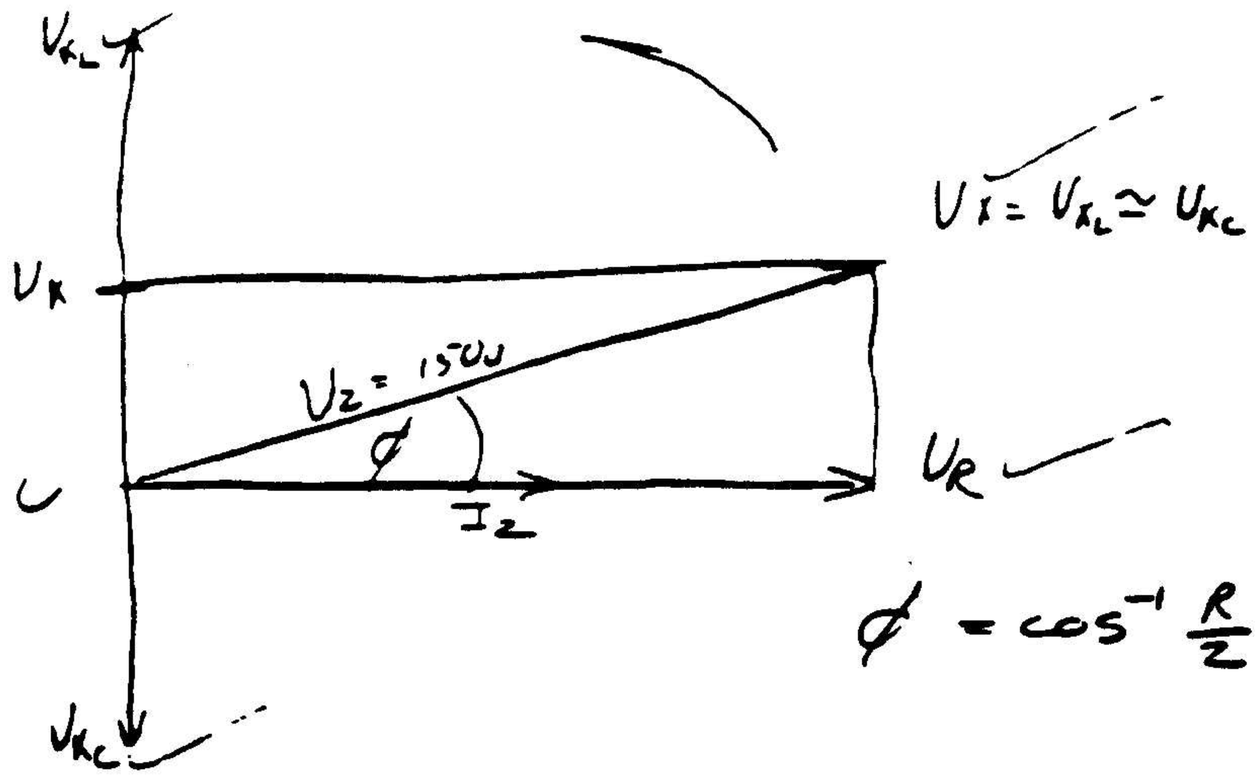
$= \frac{32}{150,79}$

$\cos ø = 0,212$

$P = \frac{V^2}{Z} \cos \phi$

$= \frac{150^2}{150,796} \times 0,212 = \underline{31.632 \text{ Watt}} \rightarrow$ (6)

1.3.5



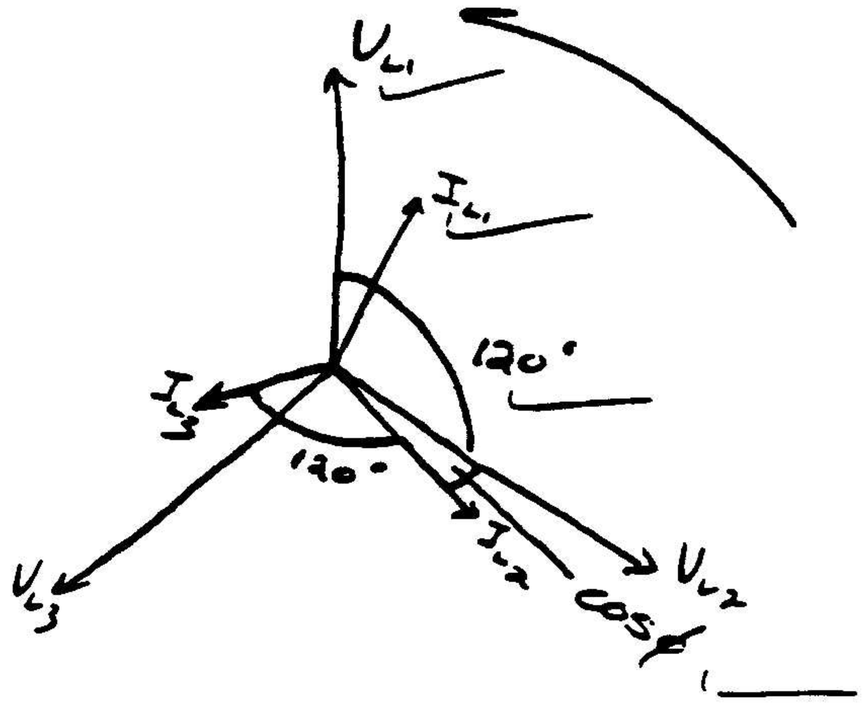
(4)
[40]

QUESTION 2
Single and three phase systems

2.1 Red white blue OR red, yellow, blue (3)

2.2 Higher voltage available per phase
uses less copper.
lower current for the same power used due to higher voltage.
smaller frame motor gives same paper. (3)

2.3



(4)
[10]

QUESTION 3

3.1

3.1.1 $\frac{N_1}{N_2} = \frac{V_1}{V_2}$ $VP1 = \frac{VL_1}{\sqrt{3}}$

$\frac{N_1}{100} = \frac{3810,511}{400}$ $= \frac{6\,600}{\sqrt{3}}$

$N_1 = \underline{952,627 \text{ turns}} \rightarrow$ $= 3\,810$

(3)

3.1.2 $I_C P = \frac{VA}{V_{PS}}$ $V_P = 3\,810$ v

$I_{4p} = \frac{25\,0000}{400}$

$I_P = \underline{625A} \rightarrow$

(3)

3.1.3 $P = \sqrt{3}$ V.I. cos ø $I_L = \sqrt{3}\ I_{ph.}$

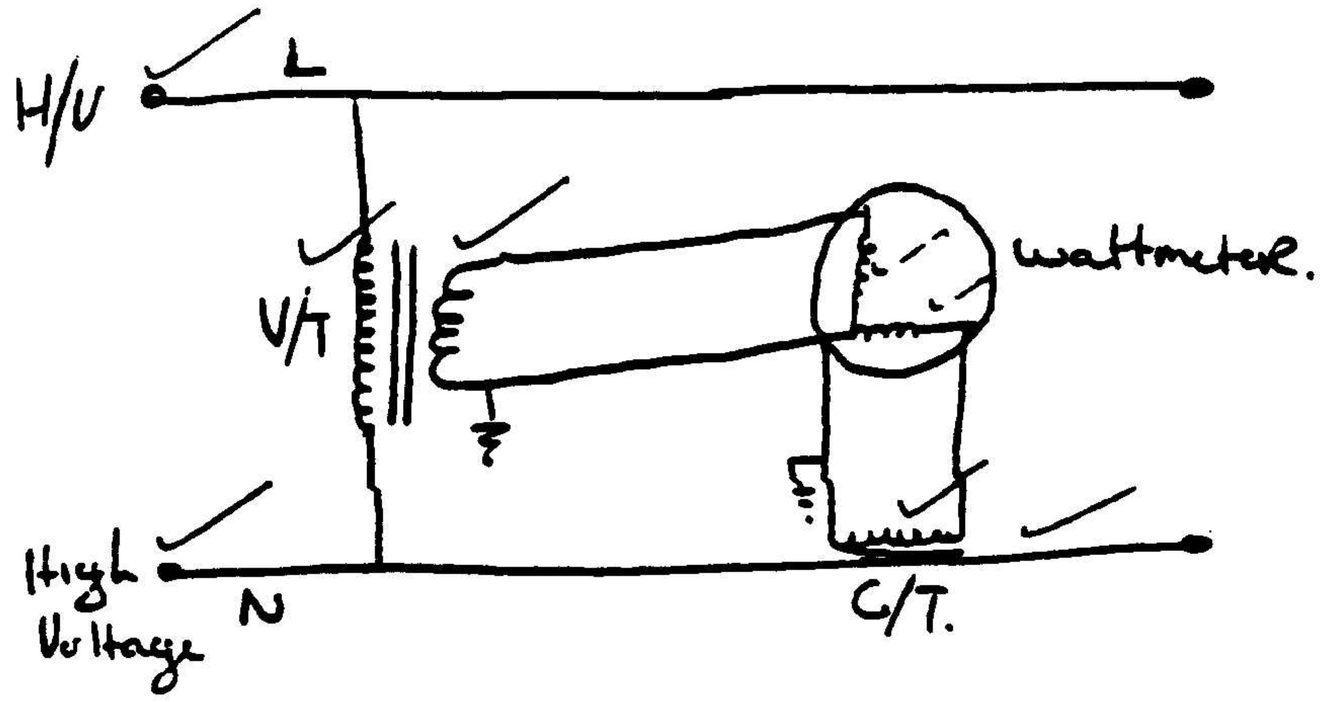
$= \sqrt{3}$ 400 x 1082,53 x 0,8 = 1082,53

P = 599999,581 watt

= 600 kW →

(3)

3.2



3.3 A transformer operates on the principle of Faraclay's kW. If no change in voltage OR current takes place, no induction can occur therefore a transformer operates on A/C. (3)

[20]

Question 4

4.1 The rotor bars and short circuit rings provide a path for the flow of current forming the squirrel cage which in turn forms a magnetic field that reacts to the main magnetic field causing the rotor to turn.

4.2

4.2.1 The speed of the rotating magnetic field

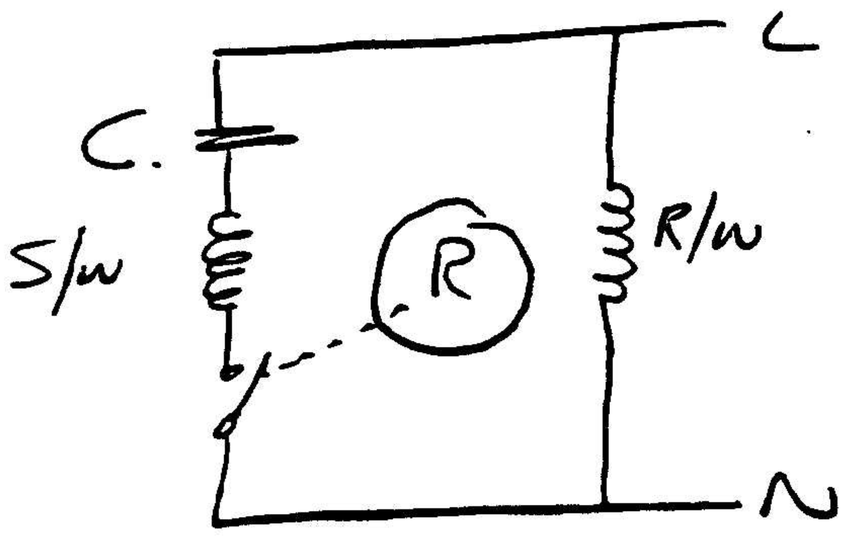
4.2.2 The difference in speed between the synchronous speed and rotor speed.

4.3 It forms a short circuit which deforms the main magnetic field and causes a rotating magnetic field.

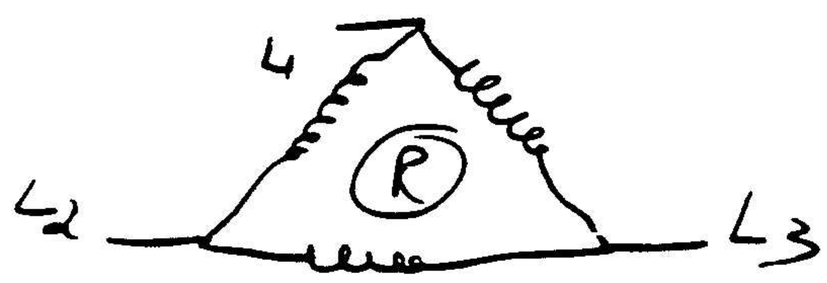
4.4 Star = lower voltage and current – this protects the motor.
Delta = Higher voltage and current providing higher torque when machine is on speed.

4.5

4.5.1



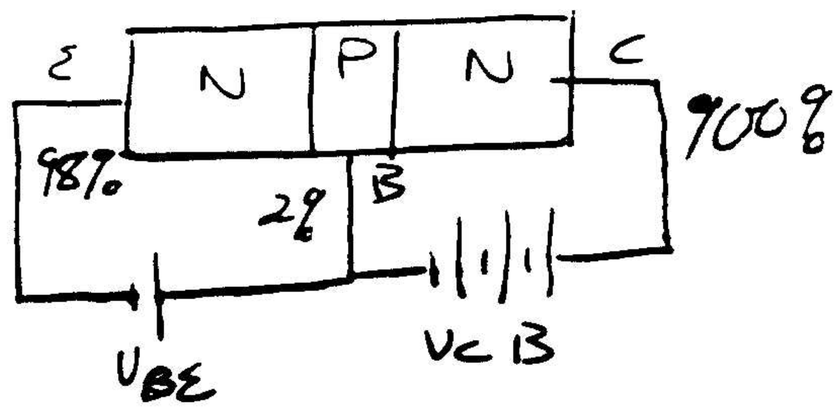
4.5.2



4.6 The capacitor in conjunction with the start winding causes a difference in phase by splitting the phase and thus causing a rotating field due to the difference in reactance of the start winding and run winding.

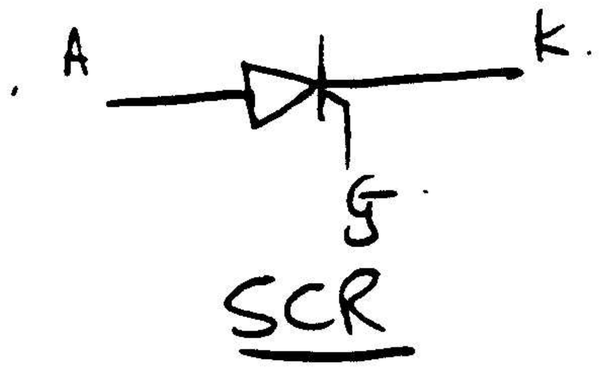
Question 5

5.1

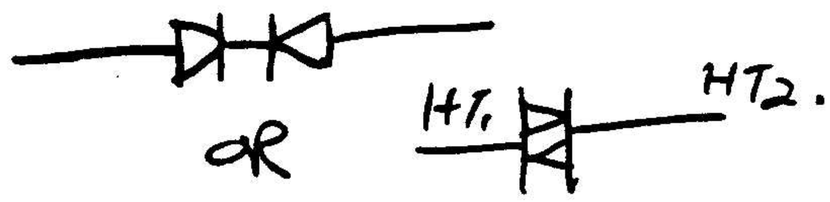


5.2

5.2.1



5.2.2

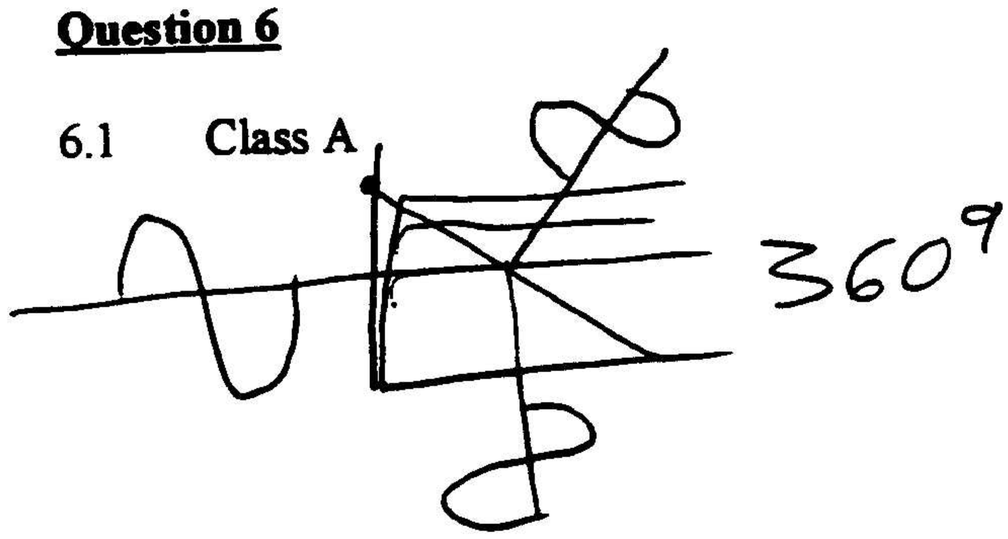


OR

DIAC

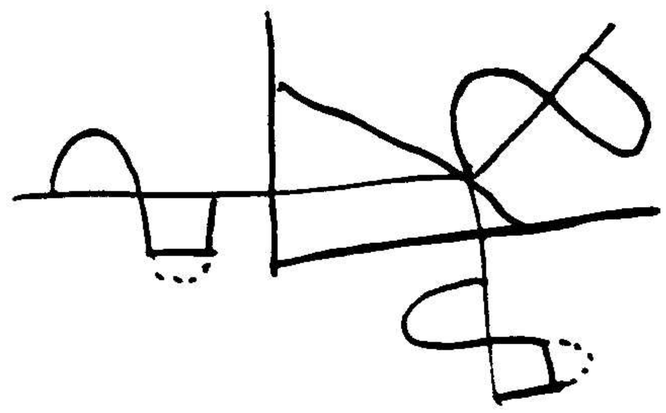
Question 6

6.1 Class A

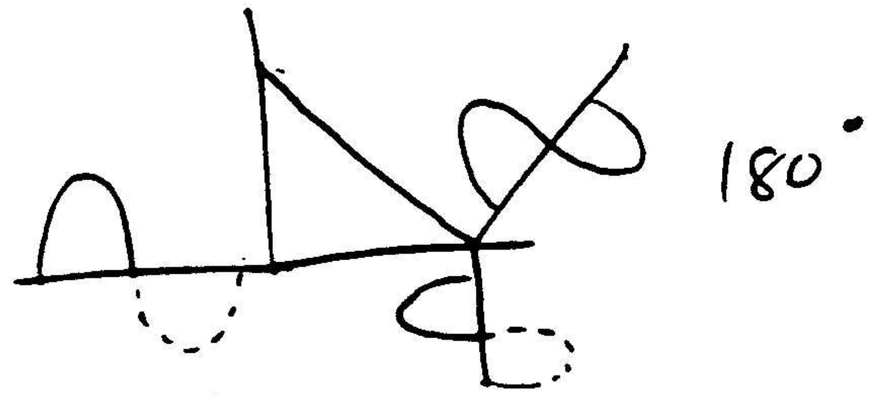


C

180-360°



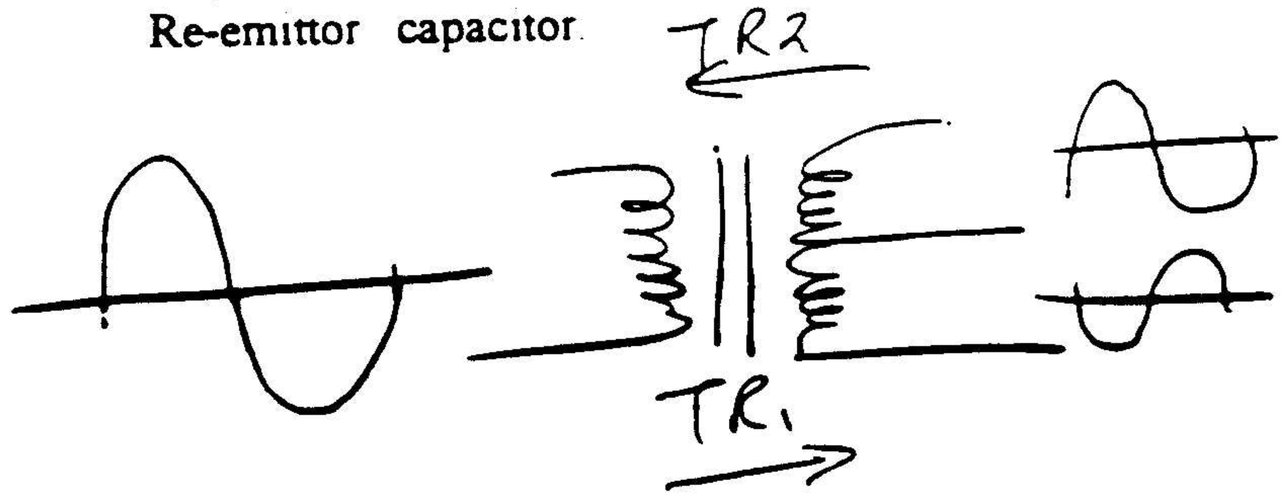
Class B



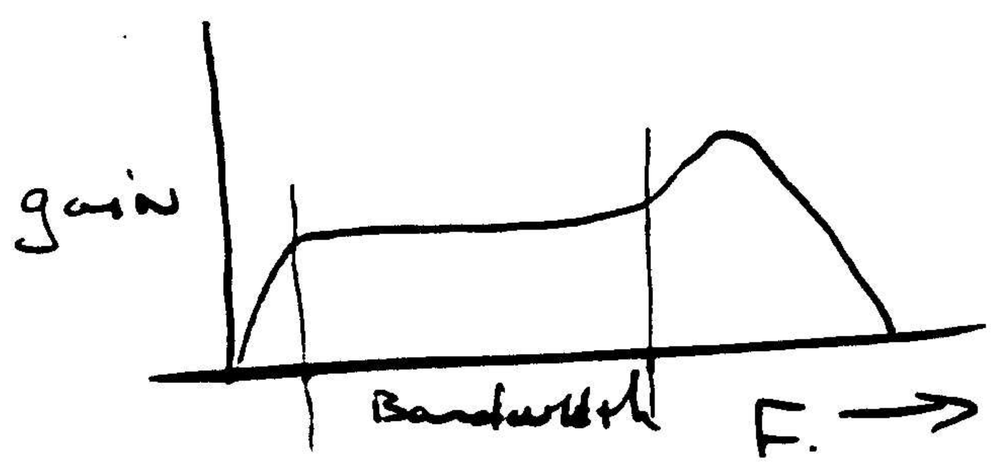
6.2 **Less Distortion**
Better Bandwidth
Lower gain / gain control

6.3 Tr1 splits input signal to T1 & T2
R1 & R2 – Bias T1 & T2
C1 - **omtak capacitor**
T1 **amplifies one half and** T 2 the other half therefore push-pull
Tr2 combines the signal into one again and provides impedance **matching on the** output.
Re-emittor capacitor

IR2

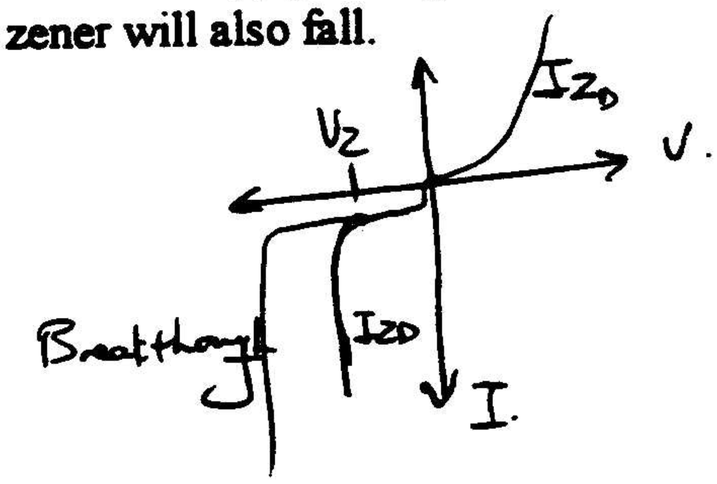


6.4



Question 7

7.1 Zener diode = voltage regulator
Used in reverse bias.
As voltage rises above the value of the Zener – the internal resistance of the zener lowers and current through the zener rises keeping the voltage over the zener constant. When the supply voltage falls below the value of the zener, the voltage over the zener will also fall.



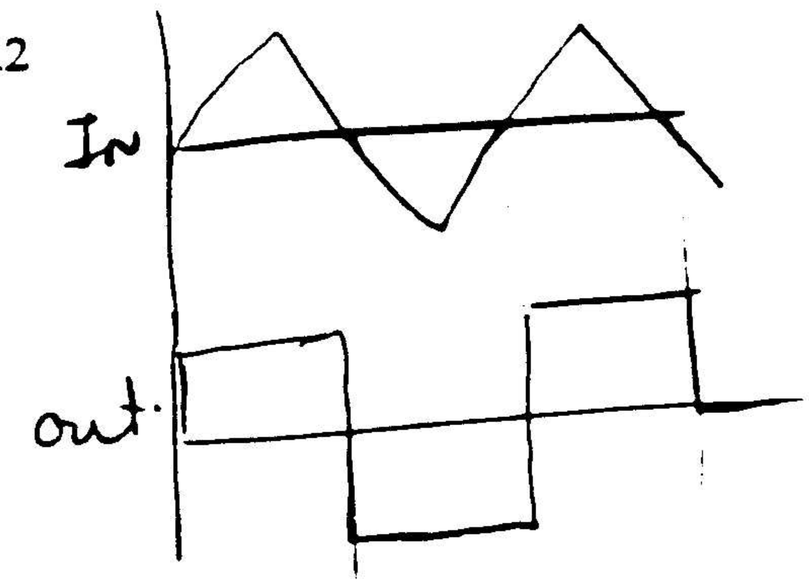
7.2

7.2.1 Minimum current needed to keep SCR conductive.
7.2.2 Value of forward biased voltage where SCR switches on without a trigger pulse.
7.2.3 Pulse/voltage applied to the gate of the SCR to switch it on.
7.2.4 The value applied in reverse bias where the SCR breaks down and starts conducting – component is destroyed in the process.

Question 8

8.1 Onbeperkte wins
Inset Impedanse = 0
Uitset impedansie = oneindig
Geen vervorming

8.2

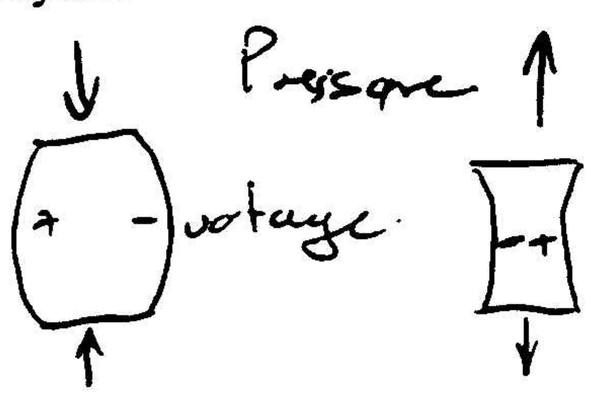


8.3 Rubber gloves
Disinfectant
Plaster
Roll bandage

Question 9

9.1 LC coupled oscillator

9.2 When prsure is applied to a crystal, a voltage appears on the end of the crystal. The frequency and pressure determines the frequency and voltage that appears on the ends of the crystal



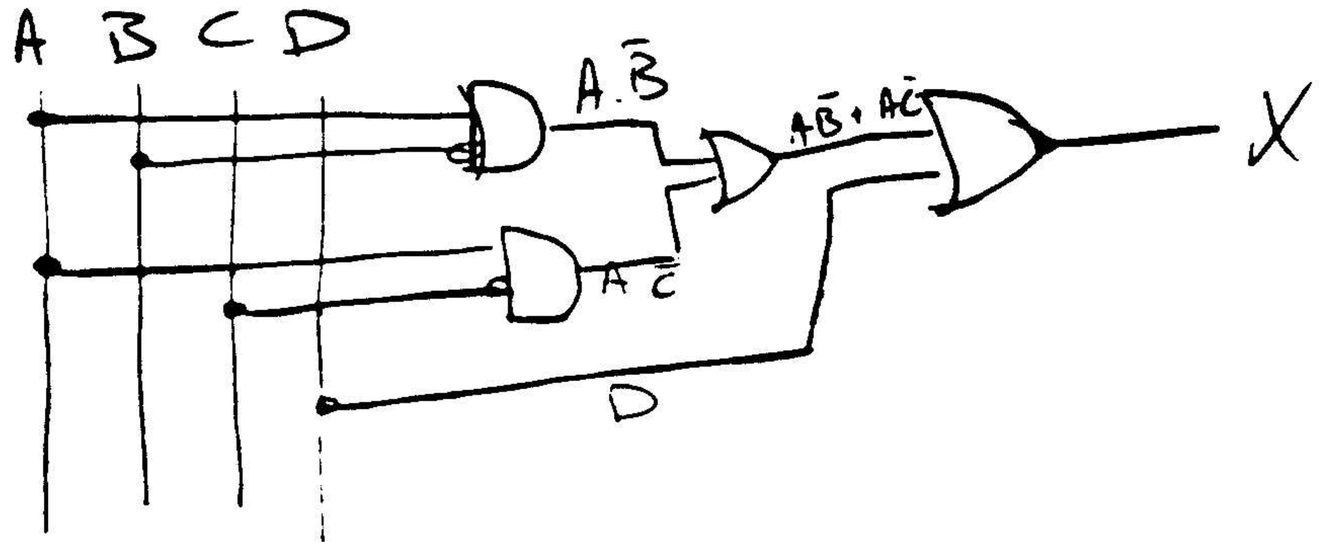
9.3 To stabilize the frequency of the oscillator. It acts as a filter for harmonic frequencies.

Question 10

10.1 $A\bar{B} + AC + BC + \bar{A}B$

10.2 **Product of sums.** Commutative laws.

10.3

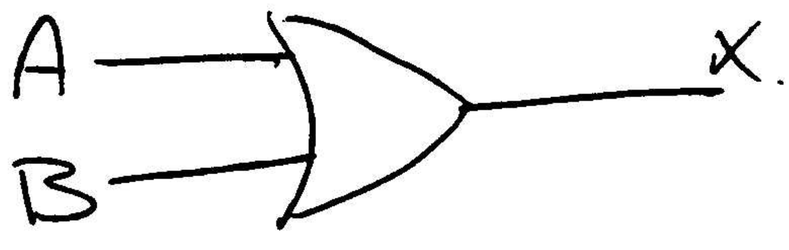


10.4 Earth yourself

Earth the equipment you work with

10.5 A+B

A	B	X
0	0	0
0	1	1
1	0	1
1	1	1



10.6 Untidy paint store
Insufficient ventilation
No precautionary measure
Careless operating procedures

10.7 Powder or CO2 type

Question 11

11.1 Current, Voltage, Resistance
11.2 Do not bump/shock
Do not exceed input voltage
Start measuring from maximum scale
Calibrate scope first

11.3 No. HIV is only transmitted through bodily fluids.
11.4 Movement of the meter with no load attached.

Total 200