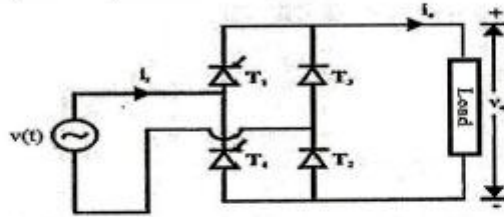
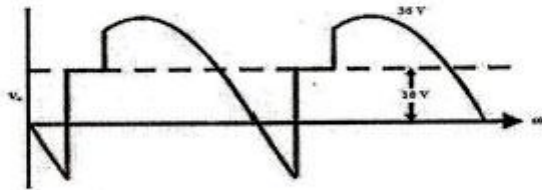


Answer 6 questions only.

- 1- For the bridge shown below with $v(t) = 36 \sin(\omega t)$ V and (firing angle) $\alpha = 30^\circ$. Assuming continuous load current,
- Draw the output voltage, diode voltage and supply current.
 - Calculate the average and RMS values of the output voltage.
 - Determine the thyristor PIV (peak inverse voltage or maximum reverse voltage).



- 2- The waveform of the output voltage of a rectifier is shown below.
- Estimate the rectifier type and load components.
 - Draw the semiconductor voltage then calculate the PIV of it.
 - Draw the current waveform.

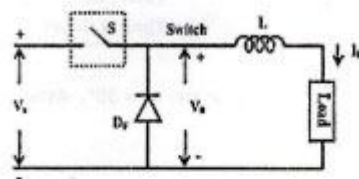


- 3- I) In a fully-controlled bridge with RL load, the measurements across the load terminals shows that the instantaneous minimum voltage is 15 V and the maximum reverse voltage (PIV) across each thyristor is 30 V.
- Calculate the firing angle.
 - Draw the output voltage and the thyristor voltage.

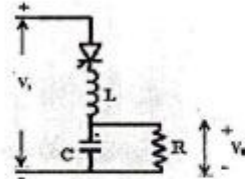
II) Three-phase uncontrolled half-wave rectifier (three diodes) is connected to a pure resistive load. If the line to neutral voltage is 240 V, calculate the average of the output voltage and the diode PIV.

- 4- Design a firing circuit to derive a single-phase half-wave controlled rectifier. Then determine the control voltage (or parameter) values corresponding to the following firing angles: 30° , 45° and 90° .
 (Note: all design values are required.)

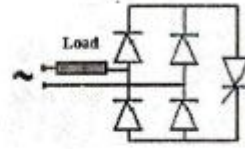
5- Write short notes about the following chopper circuits (function, operation and output waveform):



a) DC Buck chopper.



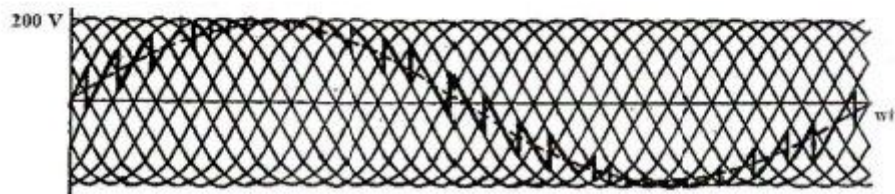
b) DC resonant chopper.



c) AC chopper.

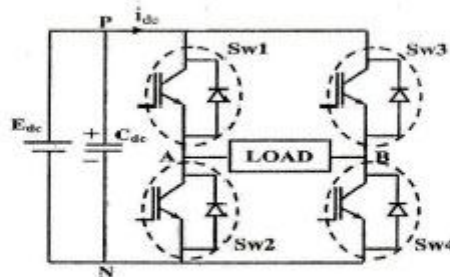
6- For the following output waveform (with bold line) of a cycle-converter, estimate its magnitude and frequency assuming 50 Hz supply then draw the following output waveforms:

- A waveform with half frequency of the output waveform.
- A waveform with doubled frequency of the output waveform.
- The output waveform with 120° delay.



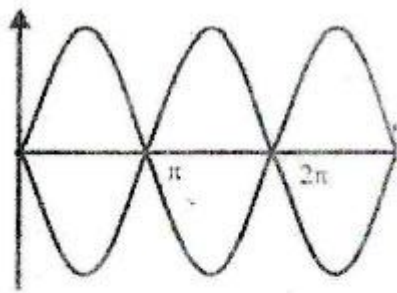
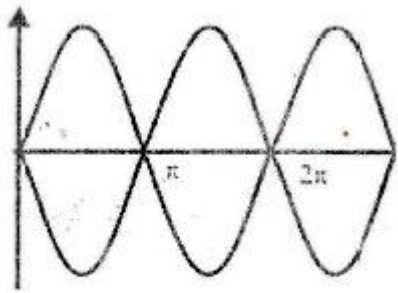
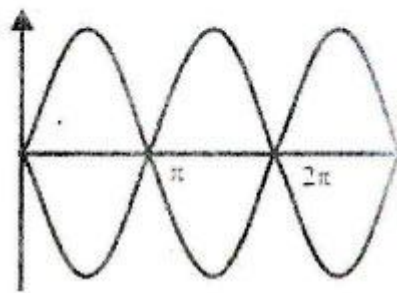
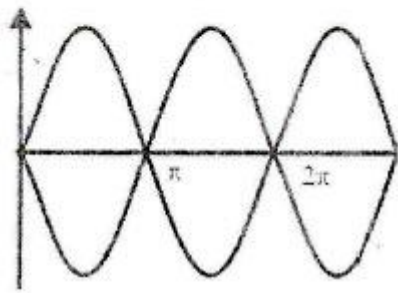
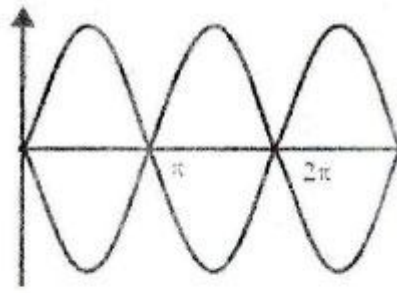
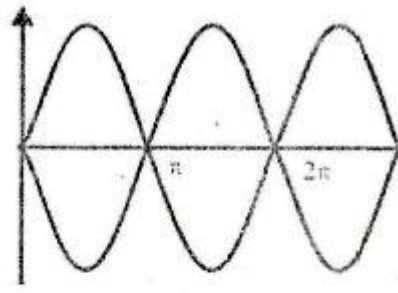
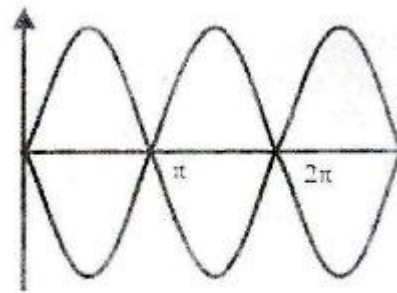
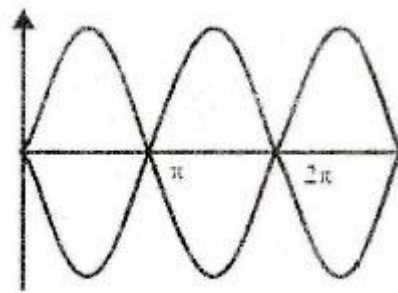
7- For the single-phase inverter shown in the following figure, draw the gate driving pulses (showing times in *mili second*) for the four transistors in order to obtain the following output waveforms:

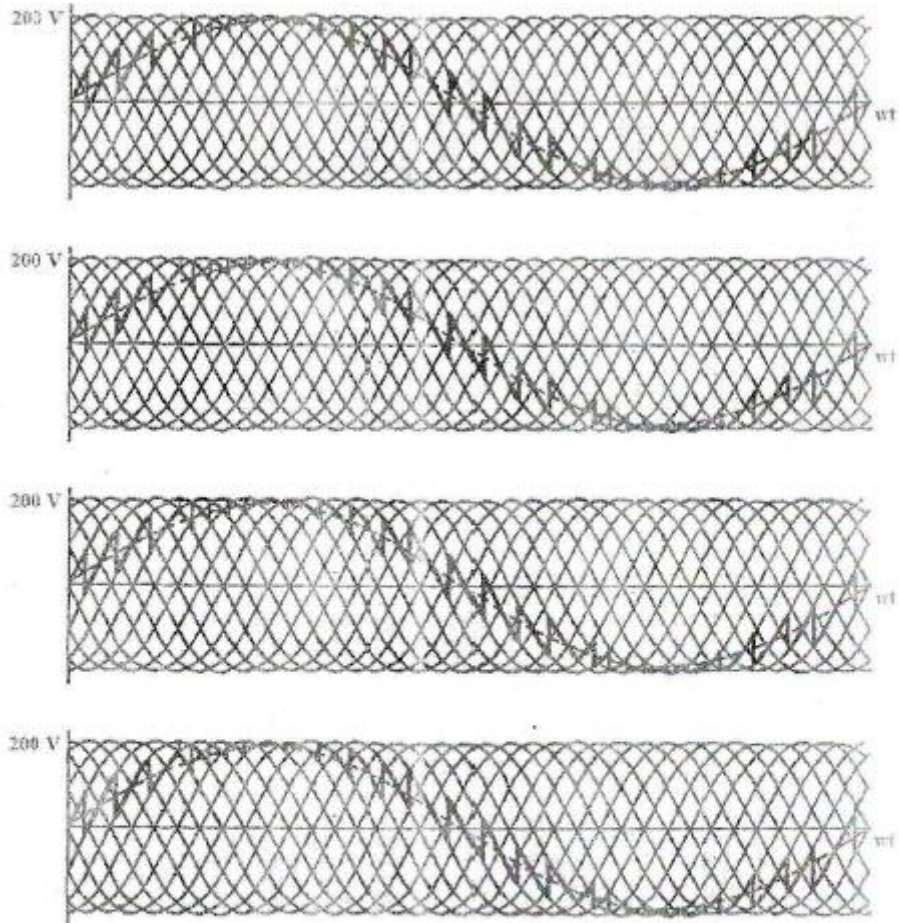
- A 50 Hz frequency with the maximum magnitude.
- A 50 Hz frequency with 70.71% of the maximum magnitude.
- The waveform of a) delayed by 120°.



8- Explain in details your role in the progress of your course project (soft and hard).

(End of questions)





The curves could be attached to the answer sheet.



With our best wishes
Khaled H. Ibrahiem
Ahmed O. M. Ibrahiem
26-1-2016