Q1:

i/ Define each of the following and mention its function:
1/ SCR  2/Electronic switch  3/Triac  
4/ GTO  5/ power conversions

ii/ If the following signal was applied to the circuit shown. Find the Load voltage and Draw its signal if the box was:
1/ SCR with $\tau = 0.0025$ second  
2/ Normal Diode

![Circuit Diagram for Q1](image1)

Q2:

For the battery charger circuit shown, if:
$Vs = 220$ v, and chopping frequency is $60$ Hz
The charging current ripple varies between $-1$ and $1$ A.
$T_{on} = 5$ms, ignoring the GTO drop voltage:

i/ What is the inductance Value?

ii/ Explain the function of the diode?

![Circuit Diagram for Q2](image2)
Q3:
A load of 12 ohm is to be regulated using a practical voltage regulator. Draw the circuit of this regulator if the source is 22 V, \( R_B = 50 \), \( V_z = 10 \) V, \( V_{BE} = 2 \) V. Find load current and the power rating at the BJT of the regulator.

Q4:
Explain the operation of the following circuit and draw the output waveform if the clock frequency shown is applied to the Base of the transistor.

![Circuit Diagram]

If we need a sine wave at \( V_{out} \), how can we obtain it?

Q5:
Describe the operation of the square inverter using 4 switching transistors to generate a sine wave of 50 Hz from a battery source, and explain the type of the filter you can use.

Q6:
\( i/ \) Describe the operation of an AC to AC converter circuit using the Triac and 
\( ii/ \) Explain the operation of this circuit if we replaced the Triac with one SCR.

Hint:
Assume \( V_{in} = V_m \sin \omega t \)