1. A square-wave 1-ϕ bridge inverter has an RL Load with $R = 15\,\Omega$, $L = 10\,mH$. The inverter output frequency is $400\,Hz$. Determine:

   (i) Value of dc source voltage required to establish a load current which has a fundamental frequency current component of $10\,A$ (rms).

   (ii) T.H.D for output voltage.

   [answer: 325^V — 0.483]

2. A single-phase H-bridge inverter has: $R = 2.4\,\Omega$ (Load) and the dc input voltage is $V_s = 48\,V$. Determine:

   (i) RMS output voltage at fundamental frequency.

   (ii) Inverter output power.

   (iii) Average and peak current of each Transistor.

   (iv) Peak Reverse blocking voltage of " ".

   (v) THD, DF of output voltage and current.

   [answer: (i) 43.2^V — (ii) $P_0 = 960\,W$ —
   (iii) $I_{peak} = 20\,A$, $I_{av} = 10\,A$
   (iv) $V_{BR} = 48\,V$ — (v) $THD_v = 48.34\%$
   $THD_i = 48.34\%$, $DF_v = 90\%$,
   $DF_i = 90\%$]

3. Single-Phase H-bridge inverter has: RL Load, where
   dc Source Voltage $= 200\,V$, $R = 20\,\Omega$, $L = 50\,mH$, $f_{sw} = 50\,Hz$
   find: I_{orms}, P_0, THD_v, THD_i

   [answer: $7.216\,A$ — $1040\,W$ — 48.43% —
   18.15%]

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①

4 Full-bridge inverter (1-phase) has a RLC Load : $R = 10\,\Omega$, $L = 31.5\,mH$ and $C = 112\,\mu F$. The inverter frequency is $f_0 = 60\,Hz$ and The dc input voltage is 220V. Find:

(a) Express The instantenous load Current in Fourier Series.

(b) RMS load Current at Fundamental Frequency.

(c) THD of load Current.

(d) The power absorbed by The load & The fundamental Power.

(e) The rms Current of dc Supply.

(f) RMS & Peak Current of each Transistor.

(g) Actual Conduction time of each Transistor.

(h) Actual Conduction time of each diode.

Answer: (a) $i_0(t) = 18.1 \sin(377t + 49.74°) + 3.17 \sin(3*377t - 70.17°)$
$+ \sin(5*377t - 79.63°) + 0.5 \sin(7*377t - 82.85°)$
$+ 0.3 \sin(9*377t - 84.52°) + \cdots$

(b) $I_{01 rms} = 12.8\,A$

(c) $THD_i = 18.6\%$

(d) $P_o = 1695\,Watt$ ($P_{01} = 1638\,Watt$

(e) $I_s = \dfrac{P_o}{V_s} = 7.7\,A$ (assuming o/p Power = i/p pow for inverter)

(f) $I_{peak} = 18.41\,A$ ($I_{rms} = \dfrac{I_{peak}}{2} = 9.205\,A$

(g) $t_{sw} = 6027.3\,\mu sec.$

(h) $t_{diode} = 2302\,\mu sec.$]

5 What is meant by inverter, typical source of The inverter, typical output of The inverter ?

6 What are inverter Types according to no. of Load phases?

7 What are inverter Types according To its input ?

8 What are inverter Applications?

9 What are Disadvantages of H-Bridge inverter ?

10 What is The effect of harmonics of inverter ?

11 How Can You Solve inverter harmonics?

②

12. The square-wave Inverter of Fig-1 has $V_{dc} = 125V$, an output Frequency of 60 HZ, and a resistive load of 12.5 Ω.
* Sketch The Currents in The Load, each switch, and The Source.
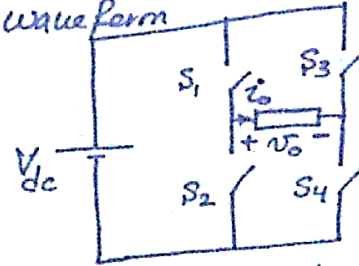* Determine The average and rms Values of each waveform

[ans.: o/p Voltage:
• $V_{orms} = 125^V$
• $V_{oav} = 0$

o/p Current:
• $I_{orms} = 10A$
• $I_{oqu} = 0$

Source Current
• $I_{srms} = 10A$
• $I_{sav} = 10A$

switch Current
• $I_{sw(rms)} = 7.07A$
• $I_{sw(av)} = 5A$]

Fig-1: Full-bridge Inverter

13. A square-wave inverter has an RL load with $R = 15\Omega$ and $L = 10mH$. The inverter output frequency is 400 HZ. Determine:
(a) The dc Source Voltage required To establish a fundamental Component of load Current of 8A (rms).
(b) THD of load Voltage and load Current.

[ans.: (a) 260V
(b) $THD_v = 48.34\%$
$THD_i = 13.7\%$]

14. The Full-bridge inverter has a switching sequence That produces a square-wave Voltage across a series RL Load. The switching frequency is 60 HZ, $V_{dc} = 100V$, $R = 10\Omega$ and $L = 25mH$.
Determine: (a) an expression of o/p current using Fourier Series.
(c) an expression of o/p Voltage " " .
(d) RMS Value of o/p current, RMS Value of o/p Voltage.
(e) THD of o/p Current, THD of o/p Voltage.
(f) DF of o/p Current, DF of o/p Voltage.
(g) Power absorbed by The Load.
(h) average current of dc supply.
(i) peak and average current of each Transistor
(j) actual Conduction time of each Transistor.
(k) " " " " " diode.

[ans.: (d) 6.64A, 100V
(e) 16.2% , 48.39%
(f) 98.93% , 70.7%

(g) 441 Watt
(h) 4.41A
(i) 9.39A, 4.695A

(j) 6.329 m$
(k) 2.005m$]

③