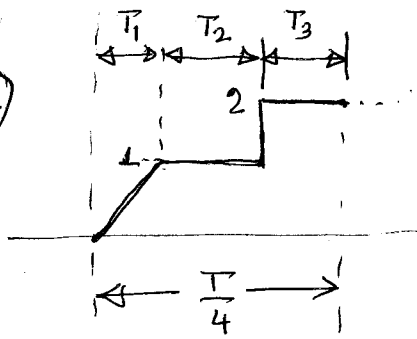


Q1



A periodic signal $x(t)$ is shown over quarter of a period T .
 (i) Sketch $x(t)$ over a complete period so that it has quarter wave symmetry.
 (ii) Comment on the presence of odd/even harmonics and sine/cosine terms.

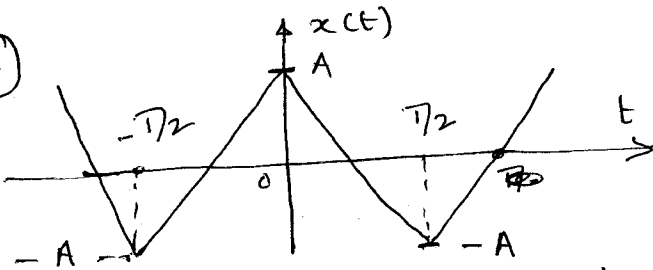
Q2

$$x(t) = 6 \sin 2\omega t + 2 \cos(4\omega t)$$

$$x(t) = 6 \sin 2t + 2 \cos(4t + \pi/6) + 4 \sin(6t - \pi/4)$$

- (i) Is it a periodic signal? If yes find out its fundamental period and fundamental angular frequency.
 (ii) Express $x(t)$ in terms complex Fourier series form. Sketch $|C_k|$ and phase ϕ_k .

Q3

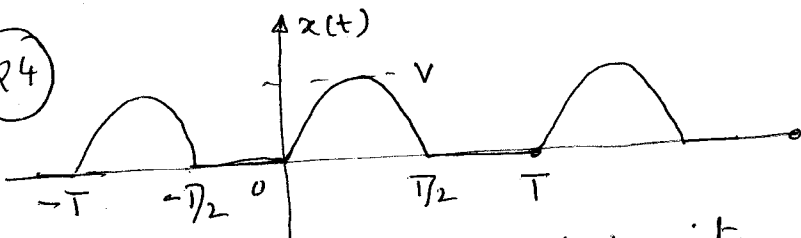


- (i) Obtain F.S coefficients d.c value, a_k and b_k
 (ii) Get Complex Fourier co-efficients C_k

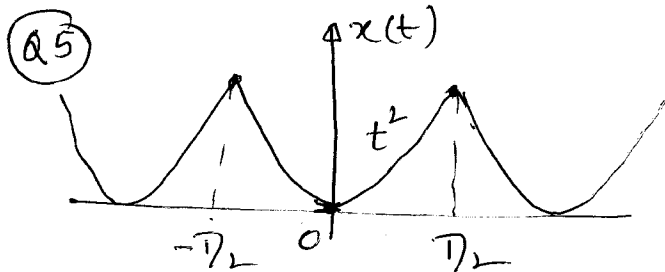
- (iii) From C_k calculated in ~~part~~ part (ii) get a_k and b_k . Check with results obtained in part (i).

- (iv) Get C_k by appropriately differentiating $x(t)$ (till periodic impulse signal is obtained).
 (i) $x(t)$ is ^{1/2 wave} sinusoidal rectifier output signal. Calculate the Fourier series co-efficients.

Q4



- (ii) Now express $x(t)$ into its odd and even parts and sketch them. Get F.S coefficients of the odd and the even parts separately and add them together to get F.S coefficients of $x(t)$. Compare the result as obtained in part (i)



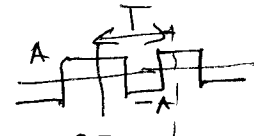
We want to get
The F.S co-eff. of $x(t)$
i.e., c_k , a_k & b_k .
Adopt a suitable method
to obtain them. Also calculate P_{av} .

Q6 Some interesting infinite series sums can be
rather easily obtained by using the ideas of
Fourier series. (shown below)

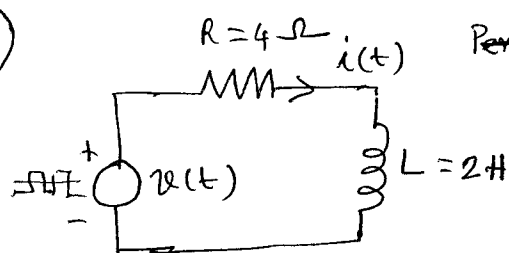
(i) $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots \infty = ?$

(ii) $\frac{1}{2^2} + \frac{1}{4^2} + \frac{1}{6^2} + \dots \infty = ?$

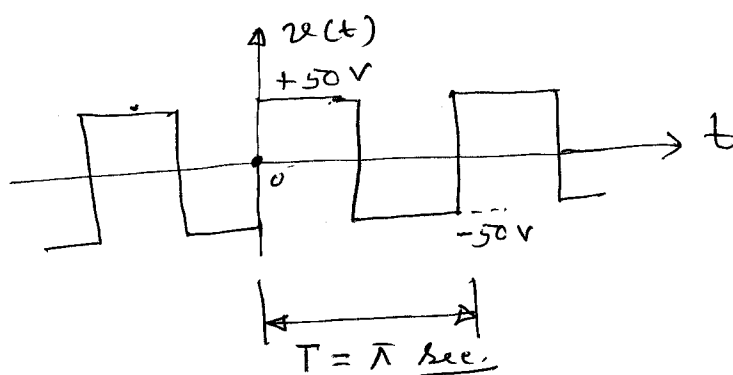
(iii) If (i) & (ii) are obtained then we can find
easily $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots \infty = ?$
find at:-

Hints:- you may try Fourier analysis of 
and a wave of Q3 or parabolic wave of Q5

Q7



Periodic $v(t)$ applied to the R-L
ckt. is periodic in nature
as shown below.



We want to find
out the steady state
 $i(t)$.

Complete this table:

order of harmonics	Max ^m value of current	Phase angle
fund: $k=1$		

Consider only first
3 predominant (!) harmonics.