

27

Monday

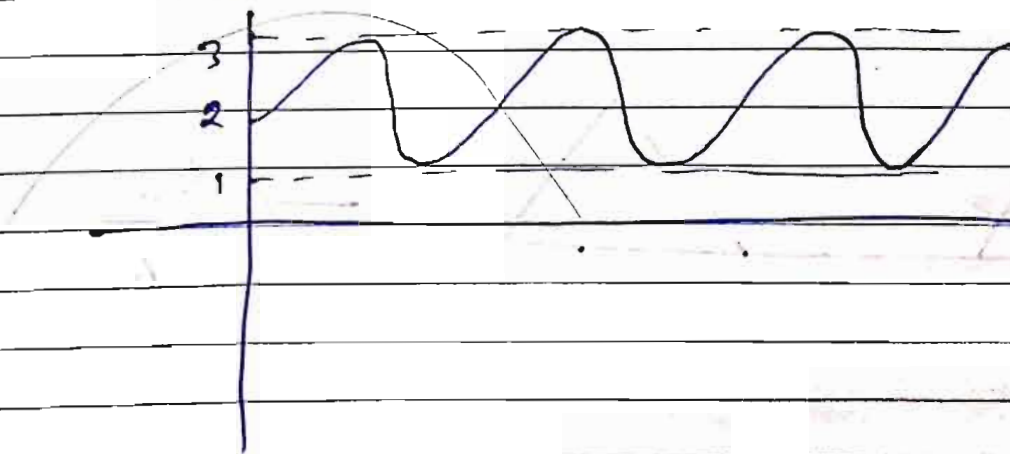
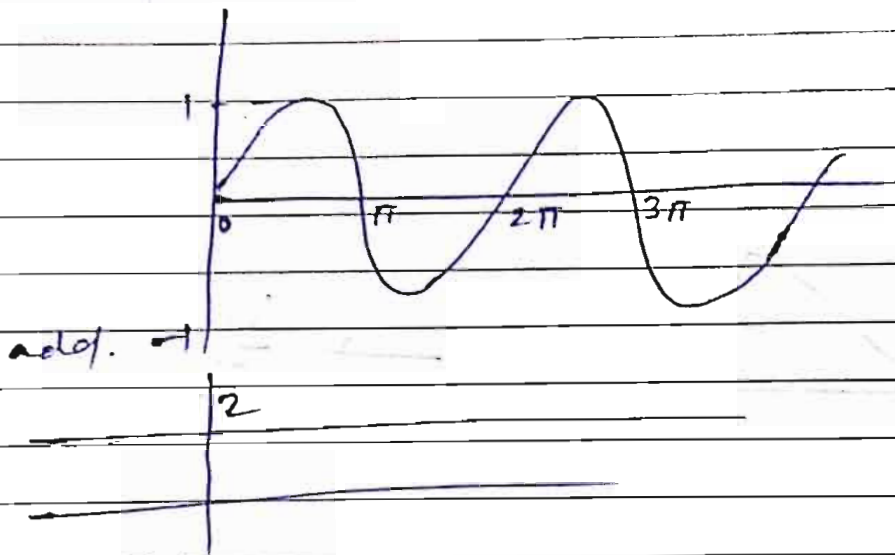
Day 27 • Week 27

RMS value of

⑨ AC + DC signal.

ex. $x(t) = A + B \sin \omega t$

Graph of $\sin t$



Note: \rightarrow

AC
 \hookrightarrow f, T



AC + DC
 \hookrightarrow f, T

June'11

Monday	6	13	20	27	
Tuesday	7	14	21	28	
Wednesday	1	8	15	22	29
Thursday	2	9	16	23	30
Friday	3	10	17	24	

Notes

Appointment

$$RMS^2 = \frac{1}{T} \int_0^T [x(t)]^2 dt$$

$$= \frac{1}{2\pi} \int_0^{2\pi} (A + B \sin \omega t)^2 dt$$

$$= \frac{1}{2\pi} \left[\int_0^{2\pi} (A^2 + B^2 \sin^2 \omega t + 2AB \sin \omega t) dt \right]$$

$$(a+b)^2 = a^2 + b^2 + 2ab$$

$$= \frac{1}{2\pi} \left[\int_0^{2\pi} A^2 dt + B^2 \int_0^{2\pi} \sin^2 \omega t dt + \int_0^{2\pi} 2AB \sin \omega t dt \right]$$

$$= \frac{1}{2\pi} \left[A^2 \int_0^{2\pi} 1 dt + B^2 \int_0^{2\pi} \frac{1 - \cos 2\omega t}{2} dt + 0 \right]$$

$$= \frac{1}{2\pi} \left[A^2 (2\pi - 0) + \frac{B^2}{2} \left(\int_0^{2\pi} 1 dt - \int_0^{2\pi} \cos 2\omega t dt \right) \right]$$

$$= \frac{1}{2\pi} \left[2\pi A^2 + \frac{B^2}{2} (2\pi - 0) \right]$$

$$= \frac{1 \times 2\pi}{2\pi} \left[A^2 + \frac{B^2}{2} \right]$$

$$RMS^2 = A^2 + \frac{B^2}{2}$$

$$RMS = \sqrt{(DC)^2 + (AC rms)^2 + \dots}$$

Notes

$$RMS = \sqrt{A^2 + \frac{B^2}{2}}$$

Appointment

$$RMS = \sqrt{A^2 + \left(\frac{B}{\sqrt{2}}\right)^2}$$

July 11

Monday	4	11	18	25	
Tuesday	5	12	19	26	
Wednesday	6	13	20	27	
Thursday	7	14	21	28	
Friday	1	8	15	22	29
Saturday	2	9	16	23	30
Sunday	3	10	17	24	31

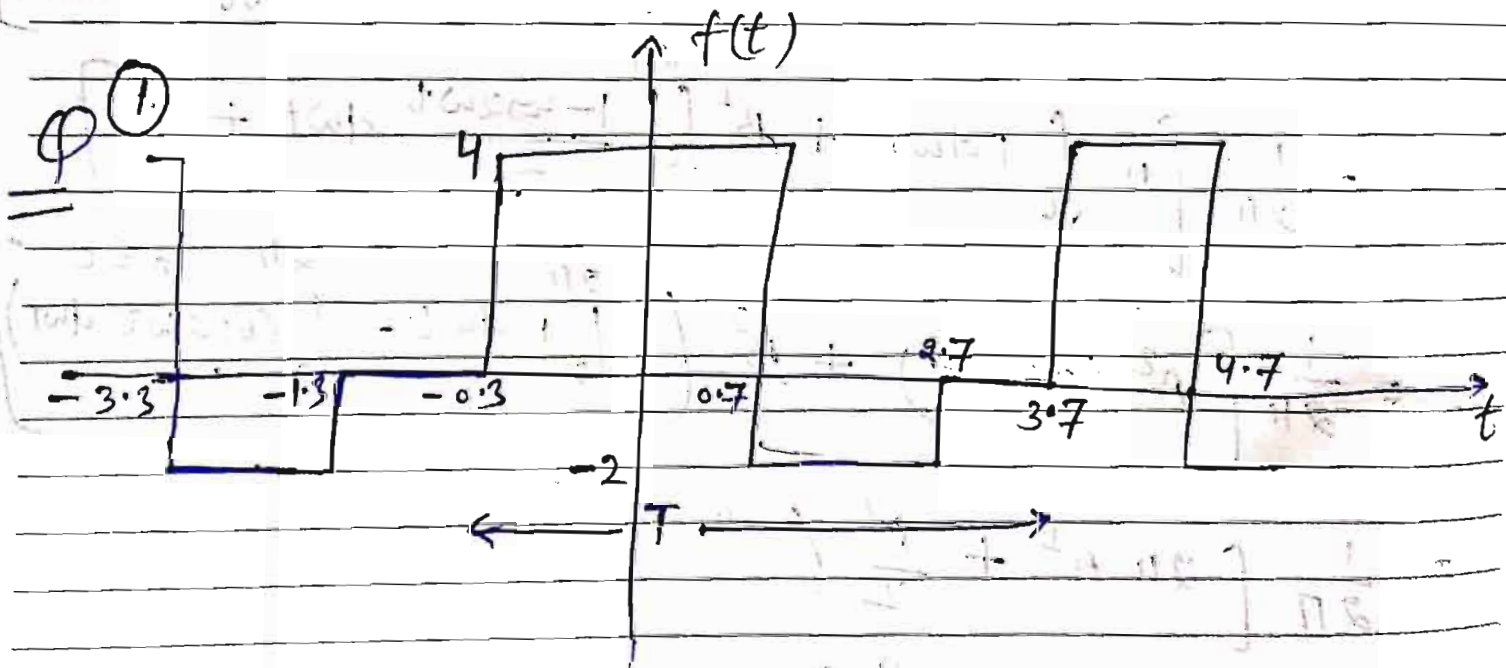
Ex

note! →

if you have a function

$$A + B \sin \omega_1 t + C \sin \omega_2 t + D \cos \omega_3 t + \dots$$

$$RMS = \sqrt{A^2 + \left(\frac{B}{\sqrt{2}}\right)^2 + \left(\frac{C}{\sqrt{2}}\right)^2 + \left(\frac{D}{\sqrt{2}}\right)^2 + \dots}$$



find the mean square value of $f(t)$
(M.S)

June'11

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Notes

Appointment

Ans fundamental Time Period

$$T = 3.7 - (-0.3)$$

$$T = 4$$

Now break the limits of $f(t)$

$$f(t) = \begin{cases} 4 & -0.3 < t < 0.7 \\ -2 & 0.7 < t < 2.7 \\ 0 & 2.7 < t < 3.7 \end{cases}$$

(Mean Square)

$$MS = \frac{1}{4} \left[\int_{-0.3}^{0.7} 4^2 dt + \int_{0.7}^{2.7} (-2)^2 dt + \int_{2.7}^{3.7} 0 dt \right]$$

$$= \frac{1}{4} \left[16 \left[t \right]_{-0.3}^{0.7} + 4 \left(t^2 \right)_{0.7}^{2.7} + 0 \right]$$

$$= \frac{1}{4} \left[16 \times (0.7 - (-0.3)) + 4(2.7 - 0.7) \right]$$

$$= \frac{1}{4} \times (16 + 4 \times 2)$$

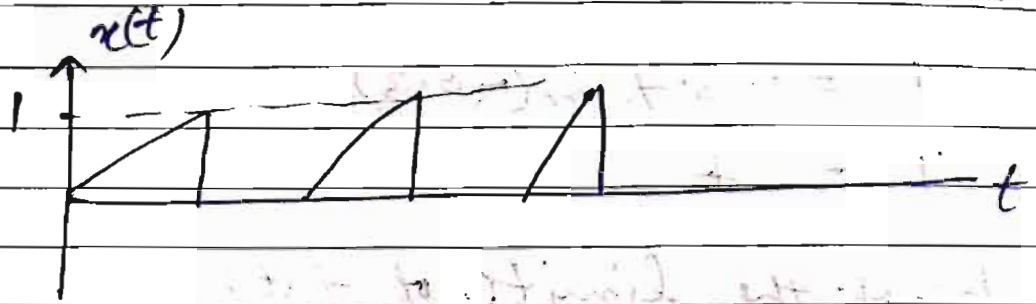
$$= \frac{1}{4} \times 24$$

Notes = 6 Ans

Appointment

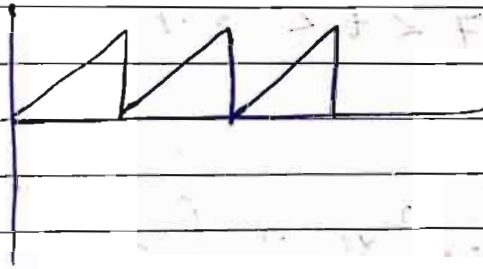
	July 11			
Monday	4	11	18	25
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Q2

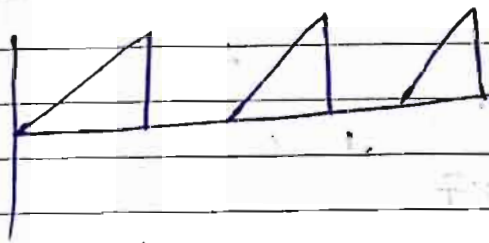


find the R.M.S value.

when saw tooth wave form given



$$RMS \rightarrow \frac{V_m}{\sqrt{3}}$$



$$RMS \rightarrow \frac{V_m}{\sqrt{3}} \times \frac{1}{\sqrt{2}} = \frac{V_m}{\sqrt{6}}$$

$V_m = 1$ in the given question

$$RMS = \frac{1}{\sqrt{6}}$$

Ans

July'11				
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Notes

Appointment

11

July value of

2011

Saturday

02

Q find RMS voltage.

Day (183-182) • Week 27

$$V(t) = 3 + 4 \cos 3t$$

$$\text{RMS} = \sqrt{(\text{DC})^2 + (\text{VAC}_{\text{rms}})^2}$$

$$\text{RMS} = \sqrt{(3)^2 + \left(\frac{4}{\sqrt{2}}\right)^2}$$

$$= \sqrt{9 + \frac{16}{2}}$$

$$= \sqrt{9+8}$$

$$= \sqrt{17}$$

Sunday 03

August '11

Monday	1	8	15	22	29
Tuesday	2	9	16	23	30
Wednesday	3	10	17	24	31
Thursday	4	11	18	25	
Friday	5	12	19	26	
Saturday	6	13	20	27	
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Appointment

04

Q (4)

R.M.S Value of resultant current which carries a DC current of 10A sinusoidal current (A-C) of Peak value 20A is

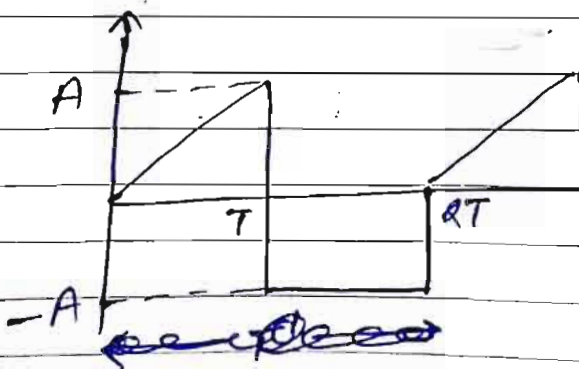
Ans $i(t) = 10 + 20 \sin \omega t$

$$RMS = \sqrt{(10)^2 + \left(\frac{20}{\sqrt{2}}\right)^2}$$

$$= \sqrt{100 + 200}$$

$$RMS = \sqrt{300}$$

Q (5)



find the RMS value.

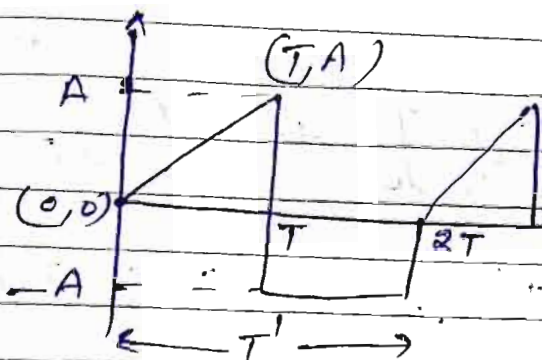
July 11

Monday	4	11	18	25
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Notes

Appointment

Q5
Ans



fundamental Time Period $T' = 2T$

$$x(t) = \begin{cases} \frac{A}{T}t & 0 \leq t < T \\ -A & T < t < 2T \end{cases}$$

These are the co-ordinate $(0, 0)$ (T, A)
 x_1, y_1 x_2, y_2

find the value of $x(t)$ when limit is $0 \rightarrow T$

$$(y - y_1) = \frac{y_2 - y_1}{x_2 - x_1} (x - x_1)$$

$$x(t) - 0 = \frac{A - 0}{T - 0} (t - 0)$$

$$x(t) = \frac{A}{T} t$$

Now,

$$RMS^2 = \frac{1}{2T} \left[\int_0^T \left(\frac{A}{T}t\right)^2 dt + \int_T^{2T} (-A)^2 dt \right]$$

$$= \frac{1}{2T} \left[\frac{A^2}{T^2} \int_0^T t^2 dt + A^2 \int_T^{2T} dt \right]$$

Notes

	1	8	15	22	29
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Sunday	7	14	21	28	

2011

06

Wednesday

July

Day (187-178) • Week 28

$$RMS^2 = \frac{1}{2T} \left[\frac{A^2}{T^2} \left[\frac{t^3}{3} \right]_0^T + \left[A^2 t \right]_0^T \right]$$

$$= \frac{1}{2T} \left[\frac{A^2}{T^2} \times \frac{T^3}{3} + A^2(2T - T) \right]$$

$$= \frac{1}{2T} \left[\frac{A^2 T}{3} + A^2 T \right]$$

$$= \frac{A^2 T}{2T} \left[\frac{1}{3} + 1 \right]$$

$$RMS^2 = \frac{A^2}{2} \times \frac{4}{3}$$

$$RMS = A \sqrt{\frac{2}{3}}$$

Appointment