MARCH 2024 | 4 | ٤ | مـــارس ٢٠٢٤

MONDAY | WEEK 10 اسبوع ١٠ | الإثنيـــن

٢٥ أمشير ١٧٤٠ ق | ٢٣ شعبان ١٤٤٥هـ

8963 Mazen Tatek

8:00

(D a) $T_1 = 2\pi$ $T_2 = \frac{2\pi}{3}$

9:00

$\frac{T_1}{T_2} = 3$, $T_0 = 2\pi$

10:00

$f(n(t) = -\sin(t + \pi)$

11:00

since sin is odd harmonic

12:00

1:00

2:00

3:00

b) non periodic

4:00

c) $\sin(2.5t) + 3\cos(1.2t) + 3\sin(\frac{t}{7} + 30)$

5:00

6:00

$T \mid \frac{9\pi}{5}$ $\frac{5\pi}{3}$ 14π

7:00

$T_0 = 140\pi$

8:00

Signal is even harmonic

MARCH 2024 | مـــــارس ٢٠٢٤

3 | ٣

WEEK 9 | اسبوع ٩

SUNDAY | الأحـــــد

٢٤ أمشير ١٧٤٠ ق | ٢٢ شعبان ١٤٤٥ هـ

(3)

a) $a_0 = \frac{1}{\pi}\int_0^{\pi} e^{-\frac{t}{2}}\,dt$ $\quad t = \pi$, $\omega_0 = 2$

$= 0.504$

$a_n = \frac{2}{\pi}\int_0^{\pi} e^{-\frac{t}{2}}\cos(2nt)\,dt$

↓

Re{ I by parts }

Rram

$a_n = 0.504 + \frac{2}{1+16n^2}$ table

$b_n = \frac{2}{\pi}\int_0^{\pi} e^{-\frac{t}{2}}\sin(2nt)\,dt$

↓

Im{ I }

$b_n = 0.504 + \frac{6n}{1+16n^2}$

$x(t) = 0.504 + \sum_{n=1}^{\infty} 0.504\left(\frac{2}{1+16n^2}\right)\cos(2nt) + \frac{6n}{1+16n^2}$

MARCH 2024 | مـــــارس ٢٠٢٤

SATURDAY | السبـــت

2 | ٢

WEEK 9 | اسبوع ٩

٢١ شعبان ١٤٤٥ هـ

٢٣ امشير ١٧٤٠ ق

b) odd & half odd $n=1,3,5$

$a_0=0 \quad a_n=0 \quad b_n=\checkmark$

integrate on $\frac{1}{4}$ period $T=2 \quad \omega_0=\pi$

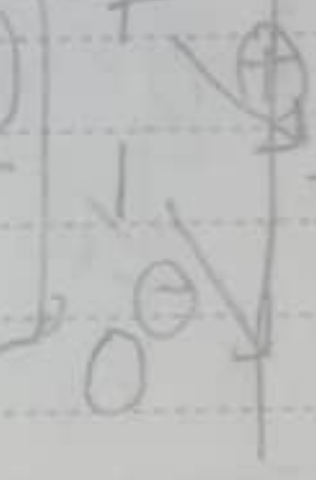
$$b_n = \frac{8A}{4}\int_0^{\frac{1}{2}} A+\sin(n\pi t)\,dt$$

$$= 8A\left[\frac{-t\cos(n\pi t)}{n\pi}+\frac{+\sin(n\pi t)}{(n\pi)^2}\right]_0^{\frac{1}{2}}$$

$$= \frac{8A}{n\pi}\left[-\cos\left[\frac{1}{2}n\pi\right]+\frac{\sin\left[\frac{1}{2}n\pi\right]}{n\pi}\right]$$

$$= \frac{4A}{n\pi}\left[\frac{(-1)^{\frac{n-1}{2}}}{n\pi}\right]$$

$$x(t)=\sum_{n=1}^{\infty}\frac{4A}{(n\pi)^2}(-1)^{\frac{n-1}{2}}\sin(n\pi t)$$



FEBRUARY 2024 | 29 | ٢٩ | فبراير ٢٠٢٤

THURSDAY | WEEK 9 | الأسبوع ٩ | الخميس

٢١ أمشير ١٧٤٠ م | ١٩ شعبان ١٤٤٥ هـ

$$X(t) = \sum_{n=1}^{\infty} \frac{8A}{(n\pi)^2} \cos(n\pi t)$$

8:00 | 9:00 | 10:00 | 11:00 | 12:00 | 1:00 | 2:00 | 3:00 | 4:00 | 5:00 | 6:00 | 7:00 | 8:00

MARCH 2024 | 1 | ١ | مارس ٢٠٢٤

FRIDAY | WEEK 9 | الأسبوع ٩ | الجمعة

٢٢ أمشير ١٧٤٠ م | ٢٠ شعبان ١٤٤٥ هـ

c) even & odd harm

$b_n = 0$ $\quad a_0 = 0$

$T = 2$ $\quad \omega_0 = \pi$

$$a_n = 4 \int_0^{\frac{1}{2}} (A - 2AT) \cos(n\pi t)\, dt$$

$$= 4A \int_0^{\frac{1}{2}} (1 - 2T) \cos(n\pi T)\, dT$$

D	S
$1 - 2T$	$\cos(n\pi t)$
-2	$\frac{\sin(n\pi t)}{n\pi}$
0	$\frac{-\cos(n\pi t)}{(n\pi)^2}$

$$= 4A \left[\frac{(1 - 2T)\sin(n\pi t)}{n\pi} - \frac{2\cos(n\pi t)}{(n\pi)^2} \right]_0^{\frac{1}{2}}$$

$$= \frac{4A}{n\pi} \left[\left(0 - \frac{2\cos\left(\frac{n\pi}{2}\right)}{n\pi} \right) + \left[\frac{2}{n\pi} \right] \right]$$

$$= \frac{8A}{(n\pi)^2} \left[\cos\left[\frac{n\pi}{2}\right] + 1 \right]$$