

# Matematika Teknik II (TE 4227 3 SKS)

<b>Prasyarat</b>	: <b>Matematika Teknik I</b>
<b>Tujuan</b>	: Mahasiswa memahami permasalahan teknik dalam bentuk PD partial, algoritma diskrit atau formulasi graph serta dapat menerapkan metode penyelesaiannya.
<b>Pokok Bahasan</b>	: Deret Fourier dan transformasi Fourier, PD parsial. Pengantar matematika diskrit: relasi, partial ordering, graph, tree, fungsi rekursif.
<b>Kepustakaan</b>	: <ol style="list-style-type: none"><li>1. Kreyzig, Erwin, <i>Advanced Engineering Mathematics</i>, 8th Edition, John Wiley &amp; Sons Inc.,1999.</li><li>2. Pipes, L.A., <i>Applied Mathematic for Engineer and Physicis</i>, McGraw-Hill,1976.</li><li>3. Chartrand, G., and R. Oeltermann, <i>Applied and Algorithmics Graph Theory</i>, McGraw-Hill International Edition, Singapore, 1993.</li><li>4. O.Albertson, M and P.Hutchinson, J., <i>Discrete Mathematics with Algorithms</i>, John Wiley &amp; Sons, Inc., Canada, 1988.</li></ol>

# Matematika Teknik II

# EVALUASI



**TUGAS : 20%**

**AKTIVITAS : 10%**

**MID TES : 30%**

**UJIAN : 40%**

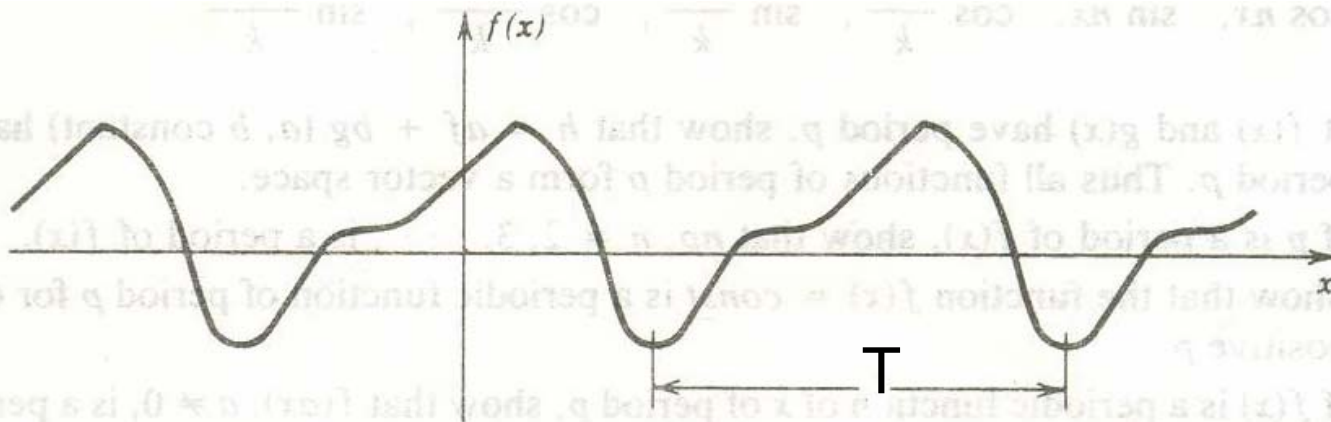
# Fungsi Periodik

- Fungsi  $f(x)$  dikatakan periodik jika

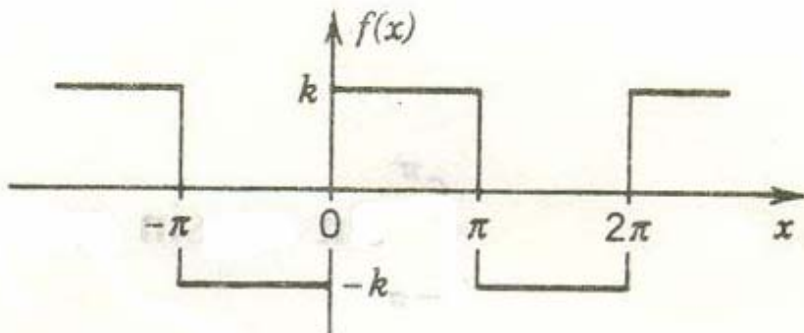
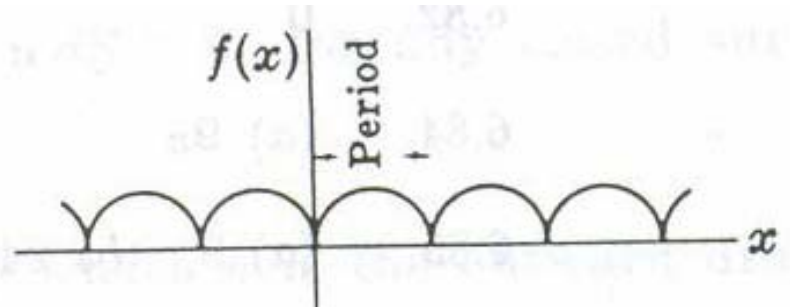
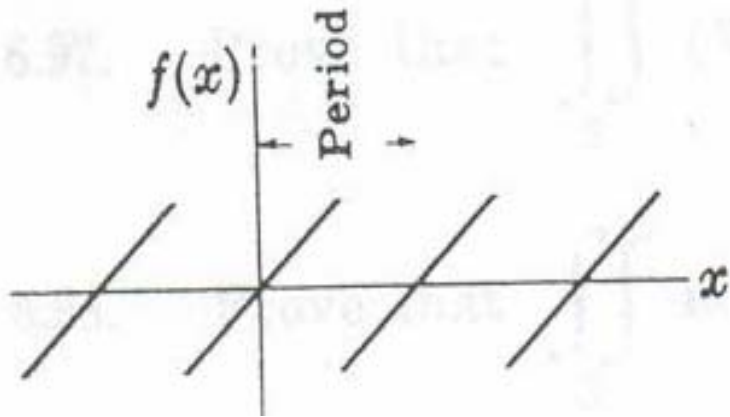
$$f(x + T) = f(x)$$

Untuk seluruh  $x$  riil

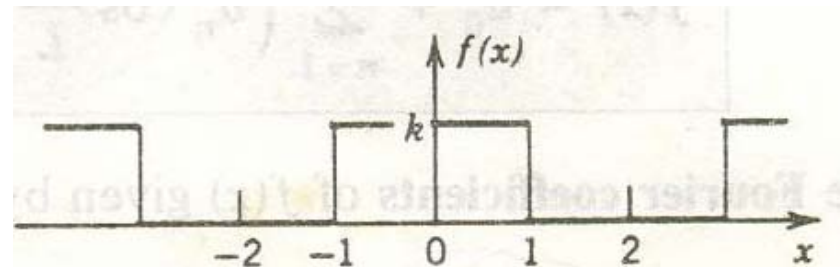
$T$  = periode



# Contoh Fungsi Periodik



$$T = 2\pi$$



$$T = 4$$

# Bentuk Gelombang Periodik

$$f(t) = A \sin(\omega t + \phi) = A \sin\left(t + \frac{\phi}{\omega}\right)$$

$A$ : Amplitudo

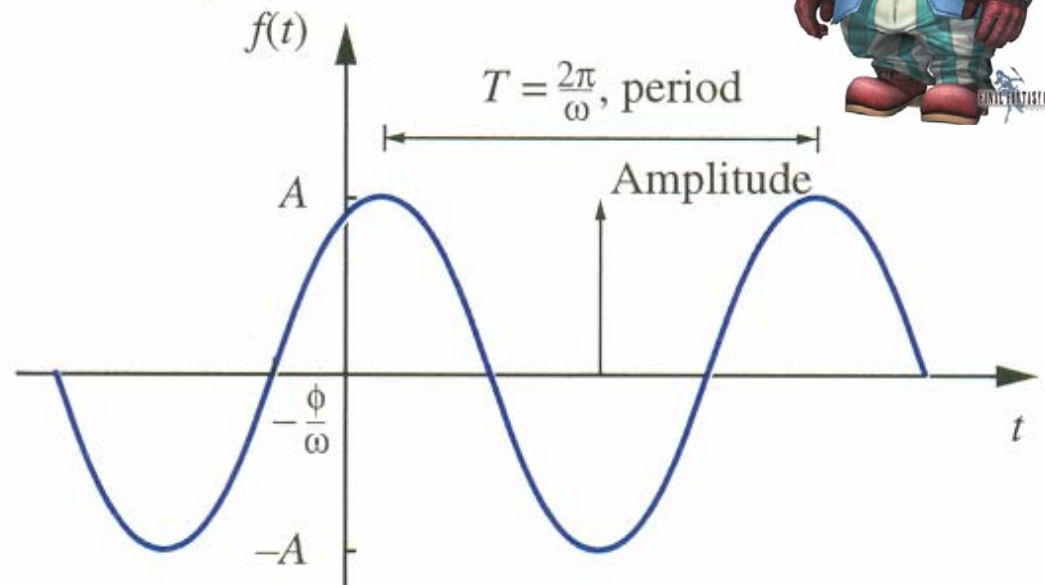
$\omega$ : frekuensi sudut (angular frequency)

$\phi$ : sudut phase

$$f = \frac{\omega}{2\pi}: \text{frekuensi}$$

$$T = \frac{2\pi}{\omega}: \text{periode}$$

$$\frac{\phi}{\omega}: \text{time displacement}$$



Contoh :

$$f(t) = 2 \sin \omega_1 t + 0.8 \sin 2\omega_1 t + 0.7 \sin 4\omega_1 t$$

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$\omega_1$  : frekuensi sudut dasar (fundamental angular frequency) atau harmonik pertama

$2\omega_1$  : harmonik kedua

Contoh :

$$f(t) = \cos 20\pi t + 0.6 \cos 60\pi t - 0.2 \sin 140\pi t$$

frekuensi sudut dasar  $\omega = 20\pi$  (harmonik pertama)

frekuensi  $f = 10\text{Hz}$ , amplitudo = 1

tidak ada harmonik ke 2, 4, 6 dan 7 namun harmonik ke 3 dan ke 7 mempunyai amplitudo 0,6 dan 0,2

$$f(t) = 2 \sin t + 3 \cos t$$

Contoh : Carilah  $f(t)$  dalam bentuk sinusoidal  
dan carilah amplitudo dan sudut phasanya

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$$R \cos(\omega t - \phi) = a \cos \omega t + b \sin \omega t$$

$$R = \sqrt{a^2 + b^2}, \quad \tan \phi = \frac{b}{a}$$

$$R = \sqrt{3^2 + 2^2} = \sqrt{13}, \quad \tan \phi = \frac{2}{3}, \quad \phi = 0,59 \text{ radian}$$

$$\text{Jadi } f(t) = \sqrt{13} \cos(t - 0,59)$$

amplitudonya =  $\sqrt{13}$  dan sudut phasanya =  $-0,59$  radian