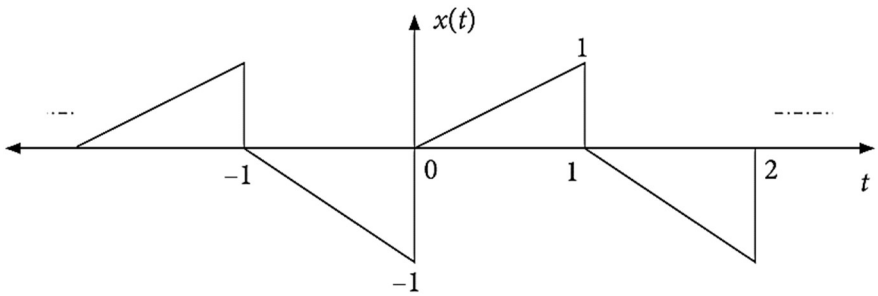
Habib University

Spring 2020
Course Title: Signals and Systems
Course Code: EE 252
Instructor: Dr. Shafayat Abrar

Q1. CLO-2 (Cognitive Level Application + Analysis)

a) Obtain compact Fourier series representation for the following periodic signal:



b) Plot one-sided amplitude and phase spectrums.
c) Find the power of signal $x(t)$.
d) Find the power of first five harmonics.
e) What percentage of total power is contributed by the first five harmonics?

Q2-Q5: CLO-1 (Cognitive Level Application + Analysis)

Q2. Consider signals given by following expressions:

a) $x(t) = 1 + t\cos(t) + t^2\sin(t) + t^3\sin(t)\cos(t)$
b) $x(t) = 1 + t + 4t^2$

Analyse the signal to extract the even and odd symmetry components.

Q3. Analyse the LTI systems with impulse responses as given below to obtain the unit-step responses:

a) $h(t) = \delta(t) - \delta(t-3)$.
b) $h(t) = tu(t-1)$.

Q4. Discuss with mathematical arguments if the following systems are time invariant.

a) $y(t) = t^2x(t)$
b) $y(t) = x(4-t)$
c) $y(t) = x(t)sin(t)$

Q5. Consider a rectangular pulse given by

$$x(t) = \begin{cases} 1 & \text{for } |t| \le 2 \\ 0 & \text{otherwise} \end{cases}$$

Draw the following functions derived from the rectangular pulse.

a) $x(3t)$,
b) $x(3t+4)$,
c) $x(-2t-2)$,
d) $x\big(2(t+2)\big)$.