

Signals and Systems

Module: ACDA 4009

1.) A.) a.) The amplifier in figure 1.1 is an inverting amplifier.

b.) Gain of inverting amplifier = $-\frac{R_F}{R_1}$

c.) Gain = $-\frac{29K}{2K}$

Gain = -14.5.

d.) $0.345 \times -14.5 = -5.0025$

Peak to peak voltage at output would be approximately 5V.

e.) Due to the minus sign in the gain calculation, the output signal will be 180° or π rad out of phase compared to the input signal.

B.) a.) The amplifier in figure 1.2 is a non-inverting amplifier.

b.) Gain of non-inverting amplifier = ~~$1 + \left(\frac{R_1}{R_2}\right)$~~ $1 + \left(\frac{R_1}{R_2}\right)$

c.) Gain = $1 + \left(\frac{27}{2}\right)$

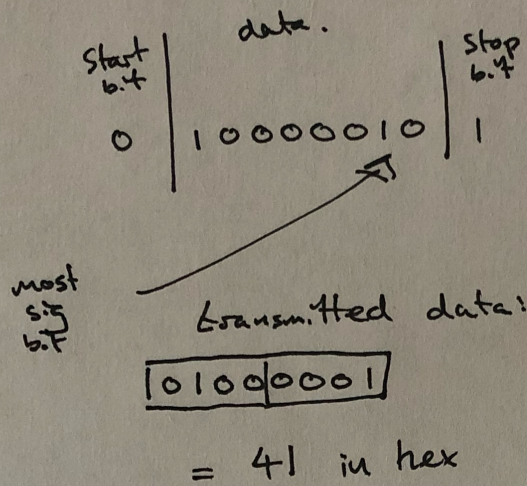
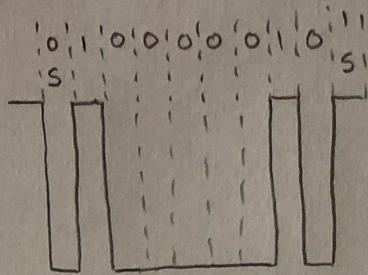
~~$1 + 13.5 = 14.5$~~
 ~~$1 + 14.5 = 15.5$~~
 $= 1 + 13.5$
 $= 14.5$

d.) ~~$0.62 \times 15.5 = 9.61V_{p-p}$~~
 $0.62 \times 14.5 = 8.99V_{p-p} \approx 9V_{p-p}$

e.) The output signal would be in phase with the input. Or 0° phase change.

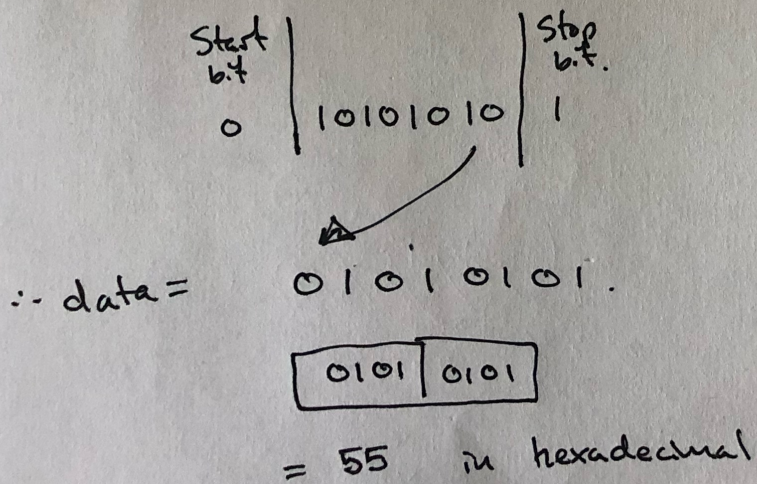
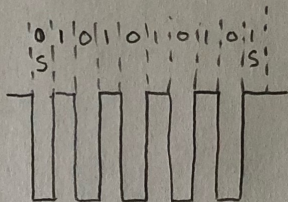
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2.) A.) a.)



b.) ASCII character is "A"

13.) c.)



b.) ASCII character is "U"

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3.) a.) The transmission protocol is Inter-Integrated Circuit or I^2C .

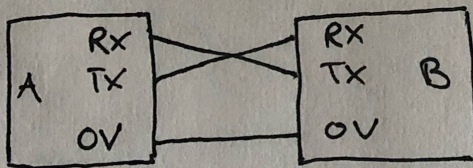
b.) I^2C is a multi-point serial transmission method. It can have multiple master and slave devices.

c.) SDA - serial data signal, this sends the data between master and slave devices. Data is sent with 8 data bits and 1 acknowledge bits. Addresses are used to identify which slave device the master wishes to communicate with.

SCL - serial clock. This line carries the clock pulses which are generated by the master device. It takes 9 clock pulses to transfer each 8 bit byte due to the need of the slave device to return an Ack bit.

d.) I^2C is used by most integrated circuit manufactures, it may be found in devices such as mobile phones or PCs,

4.) a.)



b.) It is a point-to-point transmission method

c.) Originally it was used to connect data terminal equipment. It is widely used in computer development systems, industrial control equipment, and scientific instruments. However it is limited to short distance applications.

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4.) d.) A5 in binary = 10100101.

most significant bit will transmitted ~~last~~ ~~first~~ last
so data will be flipped:

10100101.

Start and stop bit added:

start | 10100101 | stop.
0 | 10100101 | 1

A5 →

