Q1. (5 Marks)

On the left is a list of states of consciousness (states of sleep / wakefulness).
For each of these states of consciousness select ONE of the EEG waves listed .
Select the EEG wave that **defines, or is most associated with**, each state of
consciousness.
These EEG waves were covered in the week 9 lecture

	Theta waves	Sawtooth waves	Alpha waves	Beta waves	Delta waves	K-Complexes
REM Sleep	O	O	O	O	O	O
Stage 1 Sleep	O	O	O	O	O	O
Stage 2 Sleep	O	O	O	O	O	O
Alert wakefulness	O	O	O	O	O	O
Stage 3 sleep	O	O	O	O	O	O
	Theta	Sawtooth	Alpha	Beta	Delta	K-

Q2. (3 Marks)

As discussed in seminar 5, we can tune an EEG device to concentrate on a specific
frequency. This is useful when we want to detect when the person being observed has
entered into a particular state of wakefulness or sleep.

For each of the states of consciousness on the left, select one EEG frequency.
Select the frequency that would be most useful to monitor in order to detect that a person
has entered that state of consciousness.

Q2. (3 Marks)

As discussed in seminar 5, we can tune an EEG device to concentrate on a specific frequency. This is useful when we want to detect when the person being observed has entered into a particular state of wakefulness or sleep.

For each of the states of consciousness on the left, select one EEG frequency.
Select the frequency that would be most useful to monitor in order to detect that a person has entered that state of consciousness.
These frequencies were covered in the week 9 lecture

	10 Hz	6 Hz	2 Hz	50Hz
Stage 1 Sleep	O	O	O	O
Stage 3 Sleep	O	O	O	O
Relaxed wakefulness	O	O	O	O

Q3 (2 Marks)

Below are six statements regarding events in the brain that produce EEG waves.
Three of the statements are TRUE and three of them are FALSE.
Select all three TRUE statements and avoid all three FALSE statements to earn 2 marks.

☐ EEG waves are mainly associated with ion flow caused by post-synaptic potentials

☐ EEG waves are mainly associated with ion flow caused by action potentials

☐ Inhibitory brain activity does not contribute to EEG waves

☐ EEG waves are caused by ion movements inside the dendrites and cell body

☐ EEG waves are caused by ion movements outside neurons

☐ All other things being equal, EEG amplitude is greater when brain activity is synchronous than when it is asynchronous
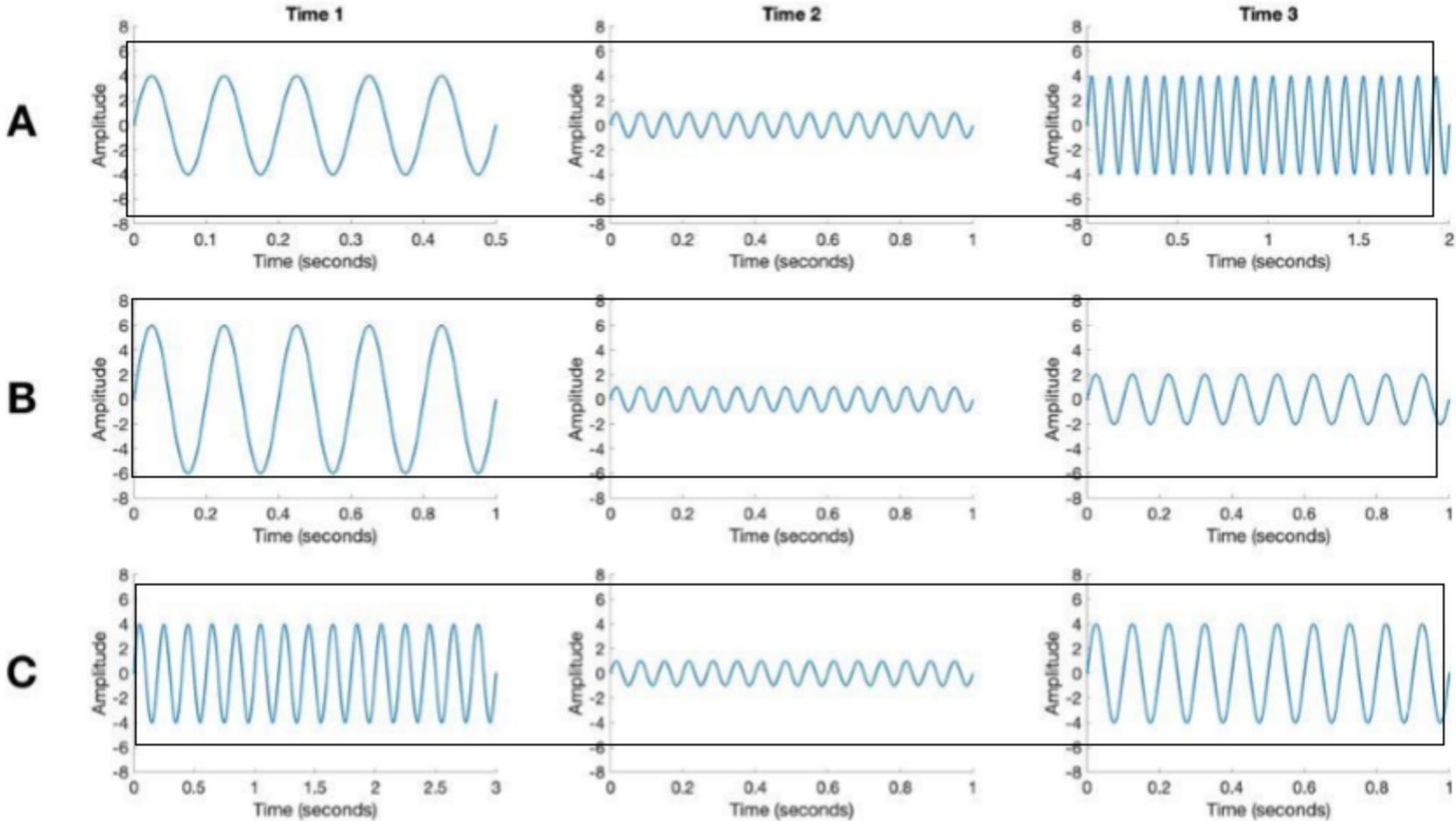

Q4. (2 Marks)

EEG activity at different frequencies can be associated with different stages of information processing. For example, this can occur when we are asked to memorise some information and then hold that information in memory- like when you are shown a phone number and asked to hold the number in your head for a period of time.

When the information is first presented (Time 1) we see an increase in EEG amplitude (relative to baseline) at 5 Hz. Next (Time 2), we see a decrease in EEG amplitude (relative to baseline) at 15 Hz. Finally (Time 3), we see an increase in EEG amplitude (relative to baseline) at 10 Hz.

Click on the row below (A, B or C) that depicts the EEG activity in these three stages of processing.

Note, the baseline amplitude for all frequencies in this problem is +/- 2. So, a 'decrease' in amplitude is represented by amplitudes smaller than +/- 2 and an 'increase' in amplitude is represented by amplitudes larger than +/- 2. (E.g. All the time 1 graphs show an increase in amplitude as the amplitudes are greater than +/-2).

Q5. (2 Marks)

Event-related Potentials (ERPs) can be used to study neural processing in individuals with psychological disorders (i.e., clinical populations). In some disorders, the brain shows a reduced ability to detect changes in patterns of sounds.

For example, look at the pattern of sounds below. There is a steady beat of repeating sound and every now and then an unexpected 'odd-ball' sound occurs indicated by the red box).

An ERP is generated each time the repeating sound is presented.

In healthy populations, when the pattern changes (the 'odd-ball' appears) the ERP that is generated shows a **larger negative peak** amplitude. However, in some clinical populations the increase in negative peak amplitude is not as large.

The figure below shows three ERP lines.

The solid black line is the ERP in response to the repeating sound. This is the same for both the healthy and clinical populations.

The two dashed lines represent the change in ERP in response to the 'odd-ball' sound. One of these lines is from a healthy population and the other from a clinical population.

Based on the above description, select the section of the ERP peak in the figure below that occurs in response to the odd-ball sound in the clinical population.