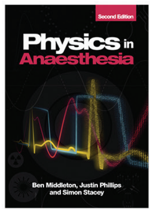
Chapter 22
Processing, storage and display



Self-assessment questions

These questions and answers, in both MTF and SBA formats, accompany *Physics in Anaesthesia 2e* and link back to the book for guidance.

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Multiple true / false questions

For each of the following questions, mark all answers as either true or false

1. Transducers:

a. Convert energy from one form to another
b. Produce a current, voltage or a variation in resistance
c. Always convert non-electrical bio-signals into electrical form
d. ECG electrodes are an example
e. Used in the measurement of arterial blood pressure are bonded semiconductor strain gauges

Pointer

- An invasive blood pressure transducer is illustrated in *Figure 6.15*.
- A fibreoptic catheter tip pressure transducer is illustrated in *Figure 15.5*.
- Both these transducers convert pressure into an analogue electrical signal.

2. In signal conditioning:

a. A low pass filter will cut mains interference noise on an ECG through amplification
b. On a band pass filter, the pass band has a gain of 1 and the stop band a gain of 0
c. Artefacts from power line interference exist as sinusoidal waves at 50 Hz
d. Baseline wander is a high frequency interference
e. Diathermy obliterates ECG signals if they are not sufficiently amplified

Pointer

- Using polarized filters is a type of signal conditioning, see *Figure 5.7*.

Did you know?

- Active noise cancelling headphones condition unwanted low frequency signals by sending out waves at 180° to the unwanted sound waves, resulting in silence.
- The phenomenon employed here is termed ‘destructive interference’.

3. Regarding the range of the frequency and potential of biosignals:

a. EEG signals contain frequencies in the range of 1–20 Hz
b. EMG signals contain frequencies in the range of 7–20 Hz
c. EEG signal potentials are larger than EMG and ECG potentials
d. ECG signals contain frequencies in the range of 0.5–40 Hz
e. ECG signal potentials are 0.1–5 mV

Pointer

- See *Chapter 21* for more on the measurement of these three biological potentials.

Single best answer questions

For each of the following questions, select the single best answer – note that more than one answer may be true but only one option represents the best answer

1. **Amplification is best described as a process of:**
   a. Boosting the signal voltage to signal noise ratio
   b. Filtering certain frequencies that do not fall within a desired bandwidth
   c. Reducing noise
   d. Changing voltages
   e. Boosting a signal to minimize the effect of subsequent noise in a processing system

Did you know?

- The impedance of the output signal from an amplifier must match the impedance of the amplifier itself.
- See *Chapter 19* for more on impedance.

2. **Following transduction, an electrical signal's waveform can be transferred into numbers using a:**
   a. Post-transduction converter
   b. Analogue-to-digital converter
   c. Organic light emitting diode monitor
   d. Digital-to-analogue converter
   e. 'Black box'

Reminder

- Analogue signals are continuous and provide an infinite number of different voltage values.
- Digital signals are binary with only two discrete states, a logic '1' (HIGH) or a logic '0' (LOW).
- Digital information is not susceptible to noise or distortion unlike analogue signals.

3. **What transducer is used in the measurement of end-tidal carbon dioxide concentrations?**
   a. Infrared sensor
   b. A Severinghaus electrode
   c. A photoplethysmograph
   d. Ultrasonic Doppler flowmeter
   e. Thermal dilution

Pointer

- For more on capnography see *Section 11.3*.
- As can be seen from *Figure 11.4*, the capnograph is displayed as an analogue waveform.

Answers to questions for Chapter 22 – Processing, storage and display

Multiple true / false questions

The following answers are true:

1. a, b and e

2. b, c and e

3. a, b, d and e

Single best answer questions

The options below represent the single best answer, although other options may also be true:

1. e

2. b

3. a